SOIL SURVEY

Summit County Ohio

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
OHIO DEPARTMENT OF NATURAL RESOURCES
Division of Lands and Soil
and
OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER
Issued November 1974

Major fieldwork for this soil survey was done in the period 1964–68. Soil names and descriptions were approved in 1969. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1968. This survey was made cooperatively by the Soil Conservation Service and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center. It is part of the technical assistance furnished to the Summit Soil and Water Conservation District.

Preparation of the survey was partly financed by the Tri-County Regional Planning Commission through a grant from the Urban Renewal Administration of the Housing and Home Finance Agency under the Urban Planning Assistance Program authorized by section 701 of the Housing Act of 1954, as amended. The Summit Soil and Water Conservation District provided aerial photographs for the soil survey.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Summit County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification and woodland suitability group of each. It also shows the page where each soil is described and the page for the capability unit in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soil from the soil descriptions and from the discussions of the capability units and woodland groups.

Foresters and others can refer to the section "Use of the Soils for Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Use of the Soils for Wildlife."

Community planners and others can read about soil properties that affect the choice of sites for nonindustrial buildings and for recreation areas in the section "Town and Country Planning."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers in Summit County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given in the section "Additional Facts About the County."

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SUMMIT COUNTY is part of the highly industrialized region of northeastern Ohio (fig. 1). The county is about 31 miles from north to south and 15 miles from east

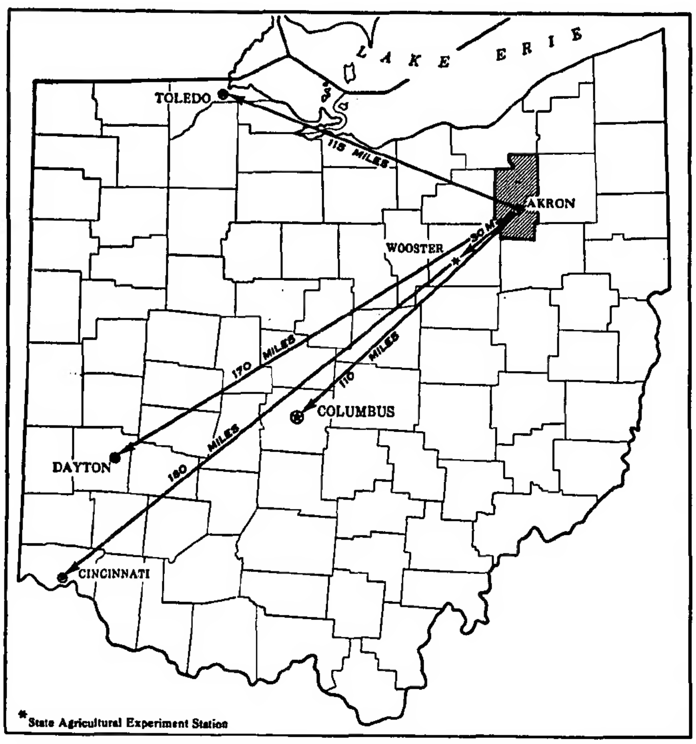

Figure 1.—Location of Summit County in Ohio.

to west. The total land area in the county is 264,320 acres, or about 413 square miles. In addition, a little less than 5,000 acres is occupied by large lakes.

According to the 1964 Census of Agriculture, only about 16 percent of the county is in farms. Dairying is the main farm enterprise and is most extensive in the southern part of the county. Several commercial orchards are located in the northern part of Summit County, and vegetables are grown in scattered areas.

About 12 percent of the county is wooded. The woodland is mostly confined to steep or wet soils that are poorly suited to cultivation or other uses.

About 25 percent of the county is highly urbanized residential, commercial, or industrial land (*13*).[1] Large areas of land, formerly farmed, are being held by absentee landowners for town and country development or for other nonfarm uses. Much of the county that is within commuting distance from cities such as Cleveland and Akron is used for scattered suburban homes and estates.

The soils in the county formed largely in glacial till or outwash material of Wisconsin age that is underlain by residual sandstone or shale bedrock.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Summit County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes the size and speed of streams; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and *soil phase* are the categories of soil classification most used in a local survey (*14*).

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important

[1] Number in parentheses refers to Literature Cited, p. 115.

characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Canfield and Chili, for example, are the names of two soil series. All the soils in the United States that have the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Canfield silt loam, 0 to 2 percent slopes, is one of several phases within the Canfield series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. One such kind of mapping unit shown on the soil map of Summit County is the soil complex.

A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Chagrin-Urban land complex is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Gravel pits is a land type in Summit County.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be readily useful to different groups of users, among them farmers, managers of woodland and pasture, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Summit County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to those who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in mapping a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community development. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The 10 associations in Summit County are delineated and numbered on the general soil map and described in the following pages. The map also identifies significant areas of the county that include very steep, escarpment-like areas. These areas are indicated on the map by a special symbol for rock escarpment.

The names used for the soil associations in this county are not exactly identical to those used in adjoining soil associations in the published soil survey for Stark County. The major soils in each association are the same, but they occur in different proportions in each county.

1. Mahoning-Ellsworth association

Nearly level to gently sloping, somewhat poorly drained and moderately well drained soils formed in moderately fine textured glacial till

This association is in scattered areas on the undulating glacial till plain in the northern half of the county. The topography in this association is an intricate pattern of nearly level areas and low rises that differ only a few feet in elevation. Small streams and drainageways in this association have no apparent valleys. They meander sluggishly through low areas. This association occupies about 9 percent of the county.

Mahoning soils make up about 55 percent of this association, Ellsworth soils about 20 percent, and less extensive soils make up the rest. Mahoning soils are nearly level to gently sloping and somewhat poorly drained. They are saturated with water in winter and spring unless drained. Ellsworth soils are moderately well drained and are on slight rises. They are seasonally wet, but for shorter periods than the adjacent Mahoning

soils. Less extensive soils in the association are Trumbull soils in the more nearly level areas, Holly soils on flood plains, Carlisle muck in depressional pockets, and small areas of the well-drained Chili soils on terraces.

Also in this association are some very narrow areas that have prominent escarpments. These areas are shown on the general soil map by the symbol for bedrock escarpments (vvv). The escarpments are commonly 100 to 150 feet in height. They occur where the sandstone bedrock crops out in bluffs that extend along valley walls. The moderately deep Loudonville and Dekalb soils occupy most of these areas, along with numerous outcrops of sandstone bedrock.

Much of this association has been farmed, but dairying and cash-grain farming are declining. Many areas that were formerly cultivated are reverting to brush and woodland. Scattered residential development and industrial sites commonly are new uses of the soils in this association.

The dominant soils in the association have slow permeability that causes them to be seasonally saturated. Artificial drainage is a major management concern for optimum crop growth. Slow permeability and seasonal wetness also adversely affect many nonfarm uses of the soils. Filter fields for septic tanks do not function well, if at all, during wet periods. Surface ponding occurs in low areas unless well-designed drainage systems are provided. The muck soils in this association are unstable if used for roads, houses, and other structures. The Ellsworth soils and Chili soils have the fewest limitations for homesites.

2. *Ellsworth-Mahoning association*

Gently sloping to steep, moderately well drained and somewhat poorly drained soils formed in moderately fine textured glacial till

This association is in scattered, rolling to hilly areas in the northern half of the county. Many small streams dissect the landscape and form ridges and valleys. The difference in elevation in the association ranges from 50 to 100 feet. The association generally lies between the less sloping soils and the very steep soils. It occupies about 9 percent of the county.

Ellsworth soils make up about 50 percent of the association, Mahoning soils about 20 percent, and less extensive soils about 30 percent. Ellsworth soils are mostly sloping to steep. They are seasonally wet for short periods, but their slope is such that surface drainage is generally good. The Mahoning soils are less sloping than the Ellsworth soils, and they are seasonally wet for longer periods in the winter and spring. Less extensive soils are the well drained Loudonville and Chili soils, moderately well drained Rittman soils, poorly drained Carlisle muck in small potholes, and Holly soils on the small flood plains.

Also in this association are some very narrow areas that have prominent escarpments. These areas are shown on the general soil map by the symbol for bedrock escarpments (vvv). The escarpments are commonly 100 to 150 feet in height. These areas occur when the sandstone bedrock crops out in bluffs that extend along valley walls. The moderately deep Loudonville and Dekalb soils occupy most of these areas, along with numerous outcrops of sandstone bedrock.

Farming is declining in this association. Slope, a severe hazard of erosion, and seasonal wetness are limitations to farming, and they are also limitations to many nonfarm uses. Residential and industrial development in this association is relatively slow because of the high cost of grading building sites. The landscape has many scenic views. The dominant soils have slow permeability that causes septic tank filter fields to function improperly, particularly in wet periods. Many good sites for small ponds or lakes are in this association.

3. *Rough broken land association*

Very steep land types and soils

This association mainly occupies the very steep valley walls of the Cuyahoga River and its tributaries, which flow in deeply entrenched valleys. The valley walls are cut by many V-shaped ravines. The difference in elevation in the association ranges from 150 to 250 feet. Most of the association is wooded and is not readily accessible except by roads that follow ridgetops or the stream valleys. This association occupies about 10 percent of the county.

All of the dominant soils and miscellaneous land types that make up this association are very steep; slopes range from 35 to 70 percent. Rough broken land is a dominant feature and makes up about 25 percent of the association. Very steep Ellsworth and Rittman soils, Shale rock land, Berks soils, and Glenford soils make up about 45 percent of the association. The rest is soils on narrow flood plains and small terraces.

Also in this association are some very narrow areas that have prominent escarpments. These areas are shown on the general soil map by the symbol for bedrock escarpments (vvv). The escarpments are commonly 100 to 150 feet in height. These areas occur where the sandstone bedrock crops out in bluffs that extend along valley walls. The moderately deep Loudonville and Dekalb soils occupy most of these areas along with numerous outcrops of sandstone bedrock.

Several recreational parks and youth camps have been developed on the very steep wooded terrain in this association. Though slope is a limitation for park improvement in places, the potential is high for development of areas for outdoor recreation and nature study.

Slope is a major limitation to most uses of this association. Many very steep areas are unstable and are subject to slippage. The very steep upper slopes are generally more stable than the lower slopes, as the upper part consists mostly of glacial till material. Throughout the association slip scars and leaning trees are evidence of landslides and slips. Slippage occurs mostly in winter and spring when the soil and soil materials are wet.

4. *Rittman-Wadsworth association*

Nearly level to moderately steep, moderately well drained and somewhat poorly drained soils that have a fragipan; formed in medium-textured and moderately fine textured glacial till

This association is in scattered areas at higher elevations than other associations in the northern half of the county. The elevation in these areas is determined by

resistant sandstone bedrock that is at a depth of 5 to 20 feet below the glacial till mantle. The soils in the association are mostly nearly level to moderately steep. Differences in elevation range from less than 10 feet in Twinsburg Township to about 50 feet in other areas. Spectacular sandstone bluffs rim this association in some places. This association occupies about 13 percent of the county.

Rittman soils make up about 50 percent of the association, Wadsworth soils about 20 percent, and less extensive soils about 30 percent. Rittman soils are mostly gently sloping but range to moderately steep along the larger streams. Near Wyoga Lake in the city of Stow, some areas of the Rittman soils are steeper. Wadsworth soils are nearly level and somewhat poorly drained soils on the uplands. The Rittman and Wadsworth soils have a dense fragipan in the subsoil that causes them to be seasonally saturated with water. This seasonal wetness is most apparent in areas of Wadsworth soils. Less extensive soils in the association are the well-drained Loudonville, Dekalb, and Chili soils and the poorly drained Sebring and Holly soils near streams.

Also in this association are some very narrow areas that have prominent escarpments. These areas are shown on the general soil map by the symbol for bedrock escarpments (vvv). The escarpments are commonly 100 to 150 feet in height. These areas occur where the sandstone bedrock crops out in bluffs that extend along valley walls. The moderately deep Loudonville and Dekalb soils occupy most of these areas, along with numerous outcrops of sandstone bedrock.

Farming in this association is declining in signficance as urbanization proceeds more and more rapidly. Artificial drainage is important to farming and to many nonfarm uses of the soils. Slow permeability in these soils results in poorly functioning filter fields for septic tanks, and unless good artificial drainage is provided, excessive wetness in winter and spring is a concern if the soils are used for building sites. The Sebring and Holly soils in this association also have many limitations for building sites.

5. *Canfield-Wooster association*

Gently sloping to moderately steep, moderately well drained and well drained soils that have a fragipan; formed in medium-textured glacial till

This association is in many scattered areas on the till plain in the southern half of the county. The elevation in these areas is above 1,000 feet. The soils in the association are mainly gently sloping to sloping but are steeper in areas adjacent to nearby valleys. In these areas, some hillsides are steep and rocky. This association occurs as scattered islands surrounded by or adjacent to soils formed in glacial outwash material. It occupies about 23 percent of the county.

Canfield soils make up about 50 percent of the association, Wooster soils about 20 percent, and less extensive soils about 30 percent. The moderately well drained Canfield soils are mostly gently sloping. The well-drained Wooster soils generally are steeper. Less extensive soils in the association are the somewhat poorly drained Ravenna soils, the well-drained Loudonville, Dekalb, and Chili soils, and the poorly drained Sebring and Holly soils on low-lying areas.

Also in this association are some very narrow areas that have prominent escarpments. These areas are shown on the general soil map by the symbol for bedrock escarpments (vvv). The escarpments are commonly 100 to 150 feet in height. These areas occur where the sandstone bedrock crops out in bluffs that extend along valley walls. The moderately deep Loudonville and Dekalb soils occupy most of these areas, along with numerous outcrops of sandstone bedrock.

Many of the commercial dairies in the county are in this association, and dairy farming is an important enterprise. Cash-grain farming is also important on many smaller farms. The city of Akron occupies one area of this association, and in other parts, scattered town and country development is taking place.

The control of erosion is a major management concern for farmers in the association. Erosion on cropland and on soils used for town and country developments causes sedimentation and pollution of streams in the county. The dense fragipan in the Canfield soils is difficult to excavate when it is dry. It causes slow permeability, and septic filter fields function improperly, especially during wet periods. The Wooster soils have fewer limitations for septic tanks than the Canfield soils. Both Wooster and Canfield soils have few limitations other than slope for building sites. The Sebring, Holly, and Ravenna soils have many limitations for nonfarm uses.

6. *Chili association*

Nearly level to steep, well-drained soils formed in sandy and gravelly glacial outwash

This association is in areas of complex topography, mostly in the southern half of the county. Terraces and kames occur in intricate patterns throughout the association. The soils are nearly level to steep, and in many places slopes are irregular. Low-lying areas, mostly in Green and Springfield Townships, contain the Portage Lakes and many pockets of swampy muck. These areas range from a few acres to 150 acres in size. Streams in the association are few in number and have low gradients. Low pockets and swampy areas collect surface runoff from this association and adjacent ones. This association, the largest in the county, occupies about 27 percent of the total acreage.

Chili soils make up about 50 percent of the association, and less extensive soils make up the rest. The well-drained Chili soils are moderately rapidly permeable and overlie rapidly permeable sandy and gravelly material. Other well-drained soils in the association are Conotton, Oshtemo, and Wheeling soils. These absorb rainfall very readily and contribute seepage to a high water table in the low lying areas. The low areas contain more poorly drained soils, such as the Jimtown, Fitchville, Damascus, Sebring, and Holly, and many spots of organic soils, such as Carlisle muck.

Much of this association is farmed, but in many areas town and country development competes with farming. Much industry in the Akron area and many of the residential areas of the city are on this association. The Chili, Oshtemo, and Wheeling soils are well suited to farming and are well suited to irrigation. In many places

the sandy and gravelly material underlying these soils is a good source of sand and gravel for construction. Many sand and gravel pits are throughout the association. Some of the pits are active, and some are abandoned.

The major limitations to farming in this association differ from place to place. The nearly level Chili soils are droughty in summer, and the more sloping ones are droughty and subject to erosion. The low-lying areas have a high water table, and drainage is needed if these areas are farmed.

Several major limitations affect nonfarm uses of the soils. The well-drained soils have few limitations for building sites, but septic tank filter fields may contaminate the ground water. Unrestricted building on this association, without concern for possible pollution of the nearby low areas, can result in a severe health hazard in a short period. The ground water table underlying the association is a unique and valuable asset to the county. The low, wet soils in the association have very serious limitations for many nonfarm uses. The muck soils are very unstable if used as construction sites. In some places these soils have a potential for pond sites. Throughout the association, they are a unique feature of the landscape.

7. *Sebring-Canadice association*

Nearly level, poorly drained soils formed in silty and clayey lacustrine material

This association is in scattered low-lying basins on uplands. These basins mark the site of glacial lakes. Erosion from higher adjacent uplands contributed large amounts of silt and clay to the old lakes. Subsequent drainage of the lakes exposed the silty and clayey sediment to soil formation. The nearby uplands still contribute surface runoff and eroded soil material to areas of this association, and seasonal ponding is common. Streams cross the association in nearly level areas and are sluggish. A high water table is present for long periods except where it is lowered by artificial drainage. This association occupies only about 2 percent of the county.

Sebring soils make up about 50 percent of the association, but in Copley and Norton Townships these soils occupy a higher percentage of the acreage. Canadice soils make up about 35 percent, and less extensive soils make up the rest. Sebring and Canadice soils are poorly drained and seasonally wet. They differ principally in their silt and clay content. Less extensive soils in this association are very poorly drained Luray, Lorain, and Carlisle soils and small areas of somewhat poorly drained Fitchville and Caneadea soils.

Little of this association has been adequately drained for crops. Most of the acreage is used for wetland pasture. Drainage outlets are difficult to establish in many places because the terrain is nearly level and the soils are low in relation to the streams.

A seasonally high water table in winter and spring and the difficulties of drainage are major limitations to farming in this association. These limitations, together with the instability and softness of the soils when they are saturated, also are serious limitations for many nonfarm uses. The association has good potential for the development of wetland wildlife habitat.

8. *Glenford-Fitchville association*

Nearly level to moderately steep, moderately well drained and somewhat poorly drained soils formed in silty lacustrine material

This association is in scattered areas along tributaries of the Cuyahoga River and Tinkers Creek. These areas were ponded in glacial times and accumulated sediment high in silt content from higher adjacent areas. Some areas of this association are dissected by the major streams and drainageways. This association occupies about 2 percent of the county.

Glenford soils make up about 50 percent of the association, and Fitchville soils make up about 45 percent. The rest is less extensive soils. Glenford soils are moderately well drained, are nearly level to moderately steep, and are on knolls, ridges, and sides of drainageways. Fitchville soils are nearly level to gently sloping. They are wet for longer periods than the Glenford soils. Less extensive soils are poorly drained Sebring soils and somewhat poorly drained Wadsworth soils.

Also in this association are some very narrow areas that have prominent escarpments. These areas are shown on the general soil map by the symbol for bedrock escarpments (vvv). The escarpments are commonly 100 to 150 feet in height. These areas occur where the sandstone bedrock crops out in bluffs that extend along valley walls. The moderately deep Loudonville and Dekalb soils occupy most of these areas, along with numerous outcrops of sandstone bedrock.

Much of this association has been farmed in the past, but cultivation for crops has been largely discontinued. Some areas have been almost totally converted from farming to residential development. In other areas the conversion has been slower, but farming has declined as the land has been acquired for development.

The dominant soils in this association have a seasonally high water table for some period of time. Artificial drainage is especially important on the Fitchville soils. The gently sloping to moderately steep areas of Glenford soils are highly susceptible to erosion in cultivated areas or in areas of construction. Soils of both series have limitations for many nonfarm uses. Septic tank filter fields in these soils do not operate properly because of the moderately slow permeability, and the soils are soft and relatively unstable when they are saturated. In the more nearly level areas of Fitchville and Sebring soils, good drainage outlets are difficult to establish. The Glenford soils have the fewest limitations for building sites.

9. *Carlisle association*

Nearly level, very poorly drained soils formed in organic material

This association is in scattered postglacial lakebeds, kettle holes, and bogs. The largest area is west of Akron and is known locally as Copley Swamp. Undrained areas are swampy and support only water-tolerant reeds, sedges, and brush. This association occupies about 3 percent of the county.

Carlisle muck makes up about 75 percent of this association. It is very poorly drained and formed in thick layers of organic material. Among the other soils in the association are Linwood muck, Willette muck, and very poorly drained Luray, Lorain, and Olmsted soils.

Some parts of the association have been drained and are used for crops. If properly managed the muck soils are very well suited to vegetables and sod.

A high water table is a major limitation to most nonfarm uses. The muck soils are very soft and unstable if used for construction, and if the water table is lowered, the organic material oxidizes and subsides.

Complete drainage results in eventual destruction of the organic part of the soils. Drained and dry areas of muck are subject to damage by fire, and they are also highly susceptible to soil blowing. Areas of this association accumulate runoff from higher adjacent areas and can easily become polluted near industrial and residential developments. They are natural basins for collecting ground water and as such are important from the standpoint of water storage. If the muck is removed and displaced by fill material, or if it is polluted from external sources, the value of this important natural resource is diminished. The association has a high potential for development of nature study areas, ponds, and other outdoor areas for nearby metropolitan centers.

10. Chagrin-Holly-Lobdell association

Nearly level, well drained, poorly drained, and moderately well drained soils formed in medium-textured recent alluvium

This association is on flood plains along the Cuyahoga River, the Tuscarawas River, and other streams in the county. The largest acreage is along the Cuyahoga River. The soils on these flood plains are nearly level and are subject to flooding. The streams follow meandering channels that change course from time to time. This association occupies about 2 percent of the county.

Chagrin soils make up about 40 percent of the association, Holly soils about 25 percent, and Lobdell soils about 15 percent. Chili, Glenford, and Orrville are less extensive soils that make up the rest. These percentages vary in the county from one watershed to another. Chagrin soils are deep and well drained. They are commonly adjacent to the river channel. Holly soils are poorly drained and occupy low areas adjacent to the river channel. Holly soils are poorly drained and occupy low areas adjacent to the sides of valleys and former stream channels that now are dry. They have a seasonally high water table. Most areas of the Chagrin and Holly soils in this association are mapped as Chagrin silt loam, alkaline, and Holly silt loam, alkaline. These soils are more alkaline than Chagrin and Holly soils mapped elsewhere. The moderately well drained Lobdell soils are generally midway between the stream channels and adjacent uplands. Chili and Glenford soils are on terraces, and Orrville soils are in small areas on the flood plains.

Chagrin and Lobdell soils are used for cultivated crops. They are well suited to such summer row crops as corn, tomatoes, and other vegetables. They also are suited to irrigation, but few areas are irrigated. The much wetter Holly soils are largely used for pasture or trees, but if drained they can be used for crops. The sandy and gravelly material underlying the soils in this association is a good source of sand and gravel. Several sand and gravel pits are located along the Cuyahoga River.

Flooding is the dominant limitation to farming or nonfarm uses of the soils. In 1959 most areas of the soils in the association were covered by floodwater. Some areas are flooded once or more each year. The hazard of flooding in the association is a limitation to construction, and construction also hinders the flow of floodwater through the valley and, in effect, raises the level of the floodwater.

Use and Management of the Soils[2]

This section contains information about the use and management of the soils for crops and pasture. It gives estimated yields of the principal crops grown in the county. It also gives facts about use of the soils for woodland, use of the soils for wildlife, and properties and limitations of the soils for engineering purposes and for town and country planning.

Crops and Pasture

Field crops, pasture, and special crops are grown in Summit County. Some of the practices needed in the management of soils for corn, wheat, oats, and other commonly grown field crops are described in the following paragraphs.

About one-third of the land area in the county is used for pasture. Alfalfa, red clover, orchardgrass, tall fescue, timothy, smooth bromegrass, and other pasture and hay plants are commonly grown. Management practices and concerns for pasture are also described in the following paragraphs.

Additional information about management can be obtained from the local office of the Soil Conservation Service or from the Ohio Cooperative Extension Service.

Maintenance of fertility.—Many soils in the county have a medium or low capacity to store and release plant nutrients for crop growth. Many of these soils are very strongly acid or strongly acid and need applications of lime and fertilizer in amounts based on the results of soils tests and the needs of the crop or pasture plants to be grown. Olmsted, Luray, Lorain, Sloan, and other dark-colored soils generally are less acid than the lighter colored soils, and they require less lime.

Utilization of crop residue.—The moderately eroded Canfield, Chili, Ellsworth, Geeburg, Rittman, Wooster, and other soils in the county have a low content of organic matter. Crop residue that is incorporated into the surface layer of these soils helps to improve the physical characteristics of the plow layer. Cover crops or sod crops can be used to help supplement the residue from corn and other crops.

Tillage.—Tillage has undesirable effects on many of the soils in Summit County. The soils that are low in organic-matter content or that have a silt loam surface layer commonly have weak structure in the plow layer. Excessive tillage disrupts soil structure and causes surface crusting after rainfall. Dekalb, Chili, Jimtown, and other soils that have a coarser textured plow layer are less susceptible to damage by excessive tillage. Canadice

[2] EARL P. CARLTON, district conservationist, Soil Conservation Service, helped to prepare this section.

and Lorain soils can be worked only within a narrow range of moisture content. They are likely to be hard and cloddy if worked when either too wet or too dry. Luray, Olmsted, Sloan, and other dark-colored soils have stronger structure and a higher organic-matter content than most of the other soils in the county. They are less susceptible to damaging surface crusting than most of the soils.

Control of erosion.—Water erosion is a hazard on all the soils that have slopes of more than 2 percent. Terrace and waterway systems, diversions, contour stripcropping, contour tillage, minimum tillage, utilization of crop residue, and the establishment of close-growing sod or cover crops are conservation practices that help to control erosion. Soil blowing is a hazard on Carlisle, Linwood, and Willette soils when they are dry and bare of vegetation.

Erosion is most active on soils that are being prepared for new pasture seedings or in pasture that is overgrazed or thin. Mulch seeding helps to control erosion during seeding, and a thick plant cover helps to maintain erosion control.

Drainage.—Artificial drainage is beneficial to crops and pasture on Canadice, Caneadea, Carlisle, Damascus, Fitchville, Frenchtown, Haskins, Holly, Jimtown, Linwood, Lorain, Luray, Mahoning, Mitiwanga, Olmsted, Orrville, Ravenna, Sebring, Sloan, Trumbull, Wadsworth, Wallkill, Willette, and other soils that are somewhat poorly drained to very poorly drained. Some areas of these soils can be easily drained by tile, and some are better drained by surface drainage. Land smoothing to eliminate wet pockets is beneficial on some soils. Moderately well drained soils in the county do not commonly need systematic drainage but random tile in persistent seepage spots helps to improve the timeliness of farmwork. Chili, Conotton, Dekalb, Oshtemo, and other well-drained soils are likely to be too dry during part of the growing season; consequently, they need practices that conserve water.

Cropping systems.—Cropping systems may include growing row crops year after year or growing crops in rotations that may or may not include grasses and legumes. A satisfactory cropping system meets the needs of the soil for improvement or maintenance of good tilth. It protects the soil during critical periods when erosion generally occurs; it helps to control weeds, insects, and diseases; and it fulfills the needs and desires of the farmer for an economic return. Row crops can be grown year after year on some of the nearly level soils if optimum management is used. More sloping soils generally require other cropping systems to fully protect and maintain the soil. As the slope increases, the need for the establishment of conservation measures increases accordingly.

Proper stocking.—Proper stocking rates and controlled grazing are management concerns that affect the maintenance of good pasture stands. It is important that pasture plants have adequate growth in spring and adequate rest before winter. Maintaining a thick cover in pasture is important for the control of erosion.

Soil compaction.—Compaction caused by grazing when the soils are too wet reduces the vigor and productivity of pasture plants. This is particularly true on Caneadea, Canadice, Geeburg, Lorain, Ellsworth, Mahoning, and other similar soils that are seasonally wet. Rotation or deferred grazing, control of weeds and brush, and the location of watering places that will encourage distribution of grazing are good management practices that help to restore and maintain the vigor of pasture plants.

Special crops

Vegetables, orchards, and sod are the important special crops grown in the county. A high level of management is needed to grow these crops successfully.

The investment in labor and machinery and the other costs of growing special crops commonly are higher than for general farm crops. The high value of the special crops makes good soil management a necessity.

Carlisle, Chagrin, and Lobdell soils are used for vegetables more than other soils in the county. Carlisle, Linwood, and Willette soils are well suited to radishes, potatoes, onions, and leafy vegetables. These muck soils are slow to warm up in spring, are subject to frost, and generally require liberal applications of potash fertilizer. Chagrin and Lobdell soils are well suited to sweet corn, pumpkins, and tomatoes.

Sod is a special crop grown on Carlisle soils. Drainage of this soil is important because ponding for extended periods causes the sod to turn yellow, results in an influx of weed seeds, and reduces trafficability.

Apples are the major orchard crop in the county. Most of the orchards are at the higher elevations on sloping soils in the northern part of the county where air drainage is good. Rittman and Ellsworth soils are most commonly used for orchards. However, the fragipan in the subsoil of the Rittman soils and the firm subsoil and substratum of the Ellsworth soils hinder the proper development of roots. Erosion control is important on these sloping soils.

Irrigation

Rainfall in Summit County generally is adequate for most crops, but it is not always timely or well distributed. Extended dry periods sometimes occur between June and September.

Many soils in the county are suited to irrigation and can be profitably irrigated if water is available. Features that affect the suitability of a soil for irrigation are water-holding capacity, slope, water-intake rate, need for drainage, depth of soil as related to rooting depth, susceptibility to stream overflow, hazard of erosion, and presence of fragipan or other layers that limit water movement. Soils that have slopes of more than 6 percent are highly susceptible to erosion if irrigated.

Soils in the county that are best suited to irrigation have been placed in five groups according to their suitability for sprinkler irrigation. Soils not listed are generally steep enough to make erosion control difficult if they are irrigated.

IRRIGATION GROUP 1

The soils in this group are nearly level or gently sloping, well drained, and permeable. They are in the Chagrin, Chili, Lobdell, Oshtemo, and Wheeling series. The soils are in stream valleys, where adequate water is most likely to be obtained from streams or from underground aquifers. They can be safely irrigated if erosion

control practices are used where slopes are 2 to 6 percent. Generally, the soils can absorb rainwater that falls immediately after irrigation. Because the available moisture capacity is lower in Chili and Oshtemo soils, irrigation is required more often on these soils than on the other soils in the group. Flooding is a hazard on the Chagrin and Lobdell soils.

IRRIGATION GROUP 2

In this group are nearly level or gently sloping, well drained soils of the Loudonville and Wooster series. These soils have moderate permeability and mostly a medium available moisture capacity. Erosion control practices are needed where slopes are 2 to 6 percent. The Loudonville soils are more droughty than the Wooster soils.

IRRIGATION GROUP 3

The soils in this group are nearly level or gently sloping, moderately well drained, and moderately permeable to slowly permeable. They are in the Bogart, Canfield, Ellsworth, Geeburg, Glenford, and Rittman series. The soils have a medium available moisture capacity, but in some of the soils the rooting zone is limited by a dense, compact fragipan in the subsoil. Erosion control practices are needed where slopes are 2 to 6 percent. If heavy rain falls after irrigation, the soil is so wet in places that plant growth is retarded and fieldwork is delayed. In some places random tile may be needed to improve drainage.

IRRIGATION GROUP 4

The soils in this group are in the Canadice, Caneadea, Damascus, Fitchville, Frenchtown, Haskins, Holly, Jimtown, Lorain, Luray, Mahoning, Mittiwanga, Olmsted, Orrville, Ravenna, Sebring, Sloan, Trumbull, and Wadsworth series.

These soils are nearly level or gently sloping, poorly drained or somewhat poorly drained, and moderately permeable to very slowly permeable. Severe wetness is a concern in some of the soils, and they are difficult to drain. They should be artificially drained before they are irrigated. If heavy rainfall occurs after irrigation, the soils may be so wet that plant growth is retarded and fieldwork delayed. Erosion control practices should be used to control erosion on slopes of 2 to 6 percent.

IRRIGATION GROUP 5

In this group are level or nearly level, very poorly drained soils of the Carlisle, Linwood, Wallkill, and Willette series. These soils have a high water table that must be lowered before crops can be grown. They are the only soils in the county that are also suited to subterranean irrigation. They can be subirrigated by using gates that control the level of water in the drainage ditch.

Capability Grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to horticultural crops or other crops that require special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or engineering.

In the capability system, all soils are grouped at three levels: the capability class, the subclass, and the unit. These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

- Class I soils have few limitations that restrict their use.
- Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.
- Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.
- Class V soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife habitat. (None in Summit County)
- Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife habitat.
- Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife habitat.
- Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife habitat, or water supply, or to esthetic purposes. (None in Summit County)

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, but not in Summit County, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion,

though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife habitat, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-2 or IIIw-4. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

In the following pages each capability unit in Summit County is described. The names of the soil series represented are mentioned in the description of each unit. The listing of the series name, however, does not necessarily mean that all the soils of that series are in the capability unit. The capability classification of each soil is given in the "Guide to Mapping Units" at the back of this survey. Borrow pits, Clay pits and Quarries, Gravel pits, and other land types, are not given a capability classification, and complexes consisting of soils mapped with Urban land also are not given a capability classification, because they are largely developed urban areas.

The descriptions of the capability unit stress optimum-level management only. Suggestions for use and management of the soils are given, and features that limit the use of the soils for field crops or pasture are pointed out. One or two soils have been included in some capability units, even though they have some properties that differ from those of the rest of the soils in the unit. Generally, the acreage is so small that placing these soils in a separate unit, is not justified. Ratings for available moisture capacity apply to the normal rooting zone of the commonly grown field crops, for example, corn and small grain. The reaction given in each description is the most acid condition expected in the rooting zone. Additional information concerning erosion control, drainage, choice of crop varieties, and other management practices can be obtained from local offices of the Soil Conservation Service or the Ohio Cooperative Extension Service.

CAPABILITY UNIT I-1

The soils in this unit are deep, are nearly level, and have a silt loam plow layer. They are in the Glenford and Wheeling series. The Glenford soil is moderately well drained, and the Wheeling soil is well drained. These soils have a deep rooting zone and medium to high available moisture capacity. Their permeability is moderately slow to moderate. They are medium acid to very strongly acid in the rooting zone, but they have a high capacity to store and supply plant nutrients.

The soils in this unit generally dry and warm early in spring and are well suited to early crops or long-season crops. They are easily farmed but are susceptible to surface crusting. Cultivated crops, pasture and hay plants, and special crops commonly grown in the county are adapted to these soils.

The major hazards to farming are few, but the control or prevention of surface crusting is important. Row crops can be grown year after year if optimum management is used. There are few or no limitations to use of the soils for pasture or meadow.

CAPABILITY UNIT IIe-1

The soils in this unit are gently sloping and have a loam or sandy loam plow layer. They are in the Bogart, Chili, Haskins, and Oshtemo series. The Bogart soils are moderately well drained. The Haskins soils are somewhat poorly drained and, unless they are drained, stay wet later in spring than the other soils. The Chili and Oshtemo soils are well drained. All the soils have a moderately deep to deep rooting zone and medium to low available moisture capacity. They generally have a low capacity to hold and supply plant nutrients. Permeability is moderately rapid, except in the Haskins soils where it is moderate in the uppermost 20 to 40 inches and slow at lower depths. Reaction in the rooting zone is strongly acid or very strongly acid, except in the Haskins soil where it is strongly acid or medium acid.

The soils in this unit dry and warm early in spring. They are well suited to early crops or long-season crops. Deep-rooted forage crops are especially well adapted to these soils. Tilth is generally good, and the soils are easily farmed. The soils are suited to the cultivated crops, pasture and hay plants, and special crops commonly grown in the county.

If these soils are cultivated, the hazard of erosion is moderate. The soils tend to be droughty in summer, but they are well suited to irrigation if erosion is controlled. Row crops can be grown frequently if optimum management is used, but erosion is difficult to control on slopes greater than 4 percent if row crops are grown year after year. A thick plant cover in pasture or meadow helps to control erosion.

CAPABILITY UNIT IIe-2

The soils in this unit are gently sloping and have a silt loam plow layer. They are in the Chili, Glenford, Loudonville, Wheeling, and Wooster series. These soils are well drained, except for the Glenford soil, which is moderately well drained. The rooting zone is deep or moderately deep. The available moisture capacity is medium to low in Chili and Loudonville soils, medium in Wooster soils, medium to high in Wheeling soils, and high in Glenford soils. Permeability ranges from moderately slow to moderately rapid. The soils are strongly acid or very strongly acid in the rooting zone, but they have a medium capacity to retain and supply plant nutrients.

The soils in this unit dry readily in spring and are well suited to early crops or long-season crops. They are easily farmed but are susceptible to surface crusting. They are well suited to the cultivated crops, pasture and hay plants, and special crops commonly grown in the county, and they are suited to irrigation if erosion is controlled.

The major concern in farming is a moderate hazard of erosion if the soils are cultivated. Row crops can be grown year after year if optimum management is used,

but erosion is difficult to control on slopes greater than 4 percent if row crops are grown that frequently. A thick plant cover in pasture or meadow helps to control erosion.

CAPABILITY UNIT IIe-3

This unit consists of gently sloping, moderately well drained soils that have a silt loam plow layer and a dense, compact fragipan in the subsoil. These soils are in the Canfield and Rittman series. They have a moderately deep rooting zone and medium available moisture capacity. Permeability is slow. Water moves laterally above the fragipan in winter and spring, and the soil above the fragipan commonly is saturated at this time. These soils are very strongly acid. They have a medium capacity to store and release plant nutrients.

Mapped areas of the Rittman soils in this unit generally include a larger number of small areas or spots of somewhat poorly drained soils than do the Canfield soils. All the soils dry slowly in spring, but because of the included wetter spots, Rittman soils dry more slowly and generally have poorer tilth than the Canfield soils. Drainage generally is not needed, except in the wetter seep spots. The soils are well suited to cultivated crops and pasture and hay plants commonly grown in the county. They are not well suited to special crops.

The major concern in farming these soils is a moderate hazard of erosion if the soils are cultivated. Row crops can be grown frequently, or even continuously, if the level of management is high. Erosion is difficult to control on slopes greater than 4 percent if row crops are grown continuously. When the soils are seasonally wet, grazing causes soil compaction and reduces growth of pasture plants. A thick plant cover in pasture or meadow helps to control erosion.

CAPABILITY UNIT IIw-1

The only soil in this unit is Orrville silt loam. This is a somewhat poorly drained, nearly level soil that is subject to flooding and has a seasonally high water table. It has a deep rooting zone in summer when the water table is low or in areas that are artificially drained. Available moisture capacity is high, permeability is moderate, and the water table is high in winter and spring. Reaction is mostly medium acid, and the soil has a medium to high capacity to store and release plant nutrients.

This soil dries slowly in spring unless it is drained. It occupies narrow flood plains along small streams and is susceptible to damaging flash floods. Flooding commonly occurs late in winter and in spring, and therefore the soil is better suited to summer crops than to small-grain crops. It is suited to pasture and hay plants that can tolerate some flooding and soil wetness. It is poorly suited to special crops.

Flooding and seasonal wetness are moderate hazards to farming. The soil can be drained, but suitable outlets are difficult to establish in some areas because the soil is low in relation to the streams. Summer row crops can be grown year after year without damage to this soil if improved or optimum management is used. Grazing pasture when the soil is saturated causes soil compaction and reduces the growth of pasture plants.

CAPABILITY UNIT IIw-2

The soils in this unit are nearly level to gently sloping and are somewhat poorly drained. They are in the Caneadea, Fitchville, Haskins, and Jimtown series. These soils have a moderately deep to deep rooting zone, and their permeability is very slow to moderate. They are saturated in winter and spring, and they are very strongly acid to medium acid in the rooting zone. The soils have a medium capacity to store and release plant nutrients.

These soils dry slowly in spring unless they are drained; consequently, they are better suited to summer crops than to small-grain crops. They are not well suited to special crops but are suited to pasture and hay plants that tolerate seasonal wetness.

Seasonal wetness is the dominant limitation to the use of these soils for farming. Some areas accumulate surface water from adjacent soils. On the gently sloping soils erosion is a hazard, and the soils that have a surface layer of silt loam are especially susceptible to surface crusting. Jimtown and Haskins soils generally have better tilth than the other soils. Artificial drainage is beneficial to crops and helps tillage. Row crops can be grown year after year if optimum management is used. Limitations for pasture or meadow are few, but grazing when the soils are seasonally wet causes soil compaction and reduces growth of pasture plants. A thick plant cover on the gently sloping soils helps to control erosion.

CAPABILITY UNIT IIw-3

The soils in this unit are nearly level and very poorly drained. They have a loam or silt loam plow layer and are in the Luray and Olmsted series. They have a deep rooting zone in summer when the water table is low. Available moisture capacity is mostly medium but ranges from medium to low in the Olmsted soil and from medium to high in the Luray soils. These soils collect ground water from adjacent soils, and droughtiness in summer is seldom a concern. Permeability is moderately slow in the Luray soil and moderately rapid in the Olmsted soil. The soils are strongly acid to medium acid, and they have a high capacity to store and release plant nutrients.

These soils dry very slowly in spring unless they are artificially drained. Undrained areas are too wet for crops in some years, but drained areas are suited to cultivated crops commonly grown in the county. The soils are suited to wetness-tolerant grasses and legumes for pasture.

A high water table in winter and spring is the dominant limitation to farming. In places the soils collect surface runoff from adjacent soils, and ponding occurs. Tilth is seldom a concern unless the soils are tilled when they are too wet. Surface crusting is seldom a concern unless the soils are intensively cultivated. Row crops can be grown year after year if optimum management is used. Soil compaction and reduced plant growth result if pasture is grazed when the soils are seasonally wet.

CAPABILITY UNIT IIw-4

The soils in this unit are nearly level or gently sloping and moderately well drained or somewhat poorly drained. They have a silt loam plow layer and a dense, compact fragipan in the subsoil. The soils are in the Canfield and

Ravenna series. They have a moderately deep rooting zone and medium available moisture capacity. Permeability is slow. A significant movement of water occurs laterally above the fragipan in winter and spring, especially in the gently sloping soil. The soil layers above the fragipan are commonly saturated in winter and spring. These layers are very strongly acid. The soils in this unit have a medium capacity to store and release plant nutrients.

The somewhat poorly drained Ravenna soils dry more slowly in spring than the moderately well drained Canfield soil. Consequently, artificial drainage is more beneficial to crops on the Ravenna soils than on the Canfield, but drainage in the Canfield soil is beneficial in some places. Soils of both series are suited to the cultivated crops and pasture and hay plants commonly grown in the county. The Canfield soil is better suited to special crops than the Ravenna soils.

The dominant limitation to farming these soils is a seasonally high water table. Erosion is a hazard on the gently sloping soils if they are cultivated. All the soils are subject to surface crusting. Row crops can be grown frequently, or year after year in places, if optimum management is used. Soil compaction occurs if pasture is grazed when the soils are seasonally wet. A thick plant cover on the gently sloping soils helps to control erosion.

CAPABILITY UNIT IIw-5

This unit consists of nearly level, deep, well drained or moderately well drained soils in the Chagrin, Lobdell, and Tioga series. These soils have a silt loam or loam plow layer, and they are all subject to flooding. They have a deep rooting zone and a high available moisture capacity, except for the Tioga soil, which has a medium to low capacity. Permeability is moderate. Reaction in the rooting zone is mostly medium acid to neutral but is mildly alkaline in one of the Chagrin soils. All of these soils have a high capacity to store and release plant nutrients.

These soils warm up and dry early in spring. They are subject to winter and spring flooding, but damaging overflows are rare late in spring and summer. Flash flooding can occur at any time where the soils are on narrow flood plains. The soils are well suited to any of the crops commonly grown in the county, but winter wheat is susceptible to damage by flooding.

A flood hazard is the major limitation to farming these soils. Tilth is generally good, but crusting occurs if the soils are intensively cultivated. Weed control is a special concern on these soils. Row crops can be grown year after year if optimum management is used. There are few limitations for pasture or meadow. These soils are well suited to irrigation.

CAPABILITY UNIT IIs-1

This unit consists of nearly level, well drained or moderately well drained soils of the Bogart, Chili, and Oshtemo series. They have a loam, silt loam, or sandy loam surface layer. They have a moderately deep to deep rooting zone and medium to low available moisture capacity. Permeability is moderately rapid, and reaction is very strongly acid or strongly acid. The capacity of the soils to store and release plant nutrients is low.

These soils dry out and warm early in spring. They are well suited to early season crops or special crops. Tilth is generally good, and the soils are suited to most crops commonly grown in the county.

The major limitation to farming is a moderate risk of drought. All of the soils are droughty in summer, but the Chili silt loams are less so than the other soils. The soils are suited to irrigation, and summer crops and pasture benefit from irrigation in most years.

CAPABILITY UNIT IIIe-1

This unit consists of sloping, well-drained soils of the Chili, Dekalb, Oshtemo, and Wooster series. These soils have a silt loam to sandy loam plow layer. They have a moderately deep to deep rooting zone and medium to low available moisture capacity. Permeability is moderate or moderately rapid, and reaction is strongly acid or very strongly acid in the rooting zone. The soils have a low capacity to store and release plant nutrients.

All of these soils dry out and warm up readily in spring. They are easily farmed and generally have good tilth. They are suited to the cultivated crops, pasture and hay plants, and special crops commonly grown in the county.

The hazard of erosion is severe in cultivated areas, and the soils tend to be droughty in summer. The soils, therefore, are better suited to early season crops than to summer row crops. They are suited to irrigation if erosion is controlled. Irrigation is beneficial to both summer crops and pasture in most years. A thick plant cover helps to control erosion in pasture or meadow.

CAPABILITY UNIT IIIe-2

This unit consists of sloping, well drained or moderately well drained, uneroded or moderately eroded soils of the Glenford, Loudonville, and Wooster series. These soils have a silt loam plow layer, a moderately deep to deep rooting zone, and mostly a medium available moisture capacity. The available moisture capacity is medium to low in the Loudonville soils, medium in the Wooster soils, and high in the Glenford soils. Permeability is moderately slow to moderate, and reaction is very strongly acid or strongly acid in the rooting zone. The soils have a medium capacity store and release plant nutrients.

These soils are suited to the cultivated crops, pasture and hay plants, and special crops commonly grown in the county. They are susceptible to surface crusting. The moderately eroded soils provide a less favorable seedbed than the uneroded soils in this unit. Tilth is generally less favorable and the soils are more difficult to work. The available moisture capacity and general fertility for plant roots are lower in the moderately eroded soils.

The hazard of erosion is severe if these soils are cultivated. Row crops or special crops can be grown fairly frequently if optimum management is used. Intensive cultivation generally results in excessive erosion losses. A thick plant cover in pasture and meadow helps to control erosion.

CAPABILITY UNIT IIIe-3

This unit consists of sloping, moderately well drained soils that have a silt loam plow layer and a dense, compact fragipan in the subsoil. These soils are in the Canfield and Rittman series. They have a moderately deep

rooting zone and medium available moisture capacity. Permeability is slow. A significant movement of water occurs laterally above the fragipan in winter and spring, and the soil layers above the fragipan are commonly saturated in winter and spring. These layers are very strongly acid. The soils in this unit have a medium capacity to store and release plant nutrients.

These soils dry more readily in spring than less sloping Canfield and Rittman soils, because surface runoff is rapid and large amounts of water move internally above the fragipan. This internal drainage causes random seeps at the base of the slopes. Water movement downslope causes these soils to be droughty in summer. The soils are suited to the cultivated crops and hay and pasture plants commonly grown in the county. They are not well suited to special crops commonly grown in the county.

The major limitation to farming is a severe hazard of erosion if the soils are cultivated. Some of the soils are moderately eroded because of past mismanagement. These moderately eroded soils provide a less favorable seedbed than the uneroded soils, their tilth is less favorable, they are harder to till properly, and general fertility and available moisture capacity are lower. Row crops can be grown frequently if optimum management is used, but intensive cultivation generally results in excessive erosion losses. A thick plant cover in pasture and meadow helps to control erosion.

CAPABILITY UNIT IIIe-4

This unit consists of gently sloping, moderately well drained soils that have a silt loam plow layer and a heavy silt clay loam or silty clay subsoil. These soils are in the Ellsworth and Geeburg series. Because of the texture of the subsoil, conditions for root growth are less than ideal. The rooting zone is moderately deep, and available moisture capacity is moderate. Permeability is slow, and reaction is strongly acid or medium acid in the rooting zone. These soils have a medium capacity to store and release plant nutrients.

The soils are commonly saturated with water for short periods in winter and spring, and they dry out rather slowly in spring. They are commonly too wet in spring and too dry in midsummer. Using random tile drainage helps to dry up wet-weather seeps and makes field work easier. These soils are suited to cultivated crops commonly grown in the county, and they are also suited to pasture and hay plants that can tolerate some wetness. They are poorly suited to special crops.

The hazard of erosion is severe if these soils are cultivated. The surface layer crusts easily and causes excessive runoff. Tilth is generally poor and plant growth is reduced unless optimum management is used. Row crops can be grown frequently, but intensive cultivation generally results in reduced plant growth. Grazing pasture on these soils when they are too wet causes soil compaction and reduces growth of plants. A thick plant cover in pasture and meadow helps to control erosion.

CAPABILITY UNIT IIIw-1

This unit consists of nearly level, poorly drained to very poorly drained soils of the Holly, Sloan, and Wallkill series. These soils have a silt loam surface layer and are subject to flooding and ponding. Holly and Sloan are mineral soils, but the Walkill soil is underlain by muck at a depth of 40 inches or less. All the soils have a deep rooting zone in summer when the water table is low. Available moisture capacity is medium to high, and permeability is moderate to slow. Reaction is medium acid to mildly alkaline in the rooting zone, and the soils have a high capacity to store and release plant nutrients.

The soils in this unit dry slowly in spring unless they are drained. They have a high water table in winter and spring. Most areas collect runoff water from adjacent soils. Improving surface drainage and internal drainage is necessary to the good growth of crops. Undrained areas are not suited to crops or pasture. Drained areas are suited to summer row crops and adapted grasses and legumes for pasture.

Flooding and seasonal wetness are the dominant hazards to farming these soils. Drainage outlets are difficult to establish in some areas because the soils are low in relation to nearby streams. Row crops can be grown year after year in drained areas without significant damage to the soil. Soil compaction and reduced plant growth result if the soils are tilled or grazed when they are wet.

CAPABILITY UNIT IIIw-2

The soils in this unit are nearly level, are poorly drained, and have a silt loam or loam plow layer. They are in the Damascus, Frenchtown, and Sebring series. The rooting zone is moderately deep to deep in drained areas or in summer when the water table is low. The available moisture capacity is medium to low in the Damascus soil, medium in the Frenchtown soil, and high in the Sebring soil. Permeability in the Damascus soil is moderately rapid, moderately slow in the Sebring soil, and slow in the Frenchtown soil. Reaction in the rooting zone is strongly acid or very strongly acid. These soils have a medium to low capacity to store and release plant nutrients. The Frenchtown soil has a dense fragipan in the subsoil.

These soils are wet for long periods unless they are artificially drained. If drained, they are well suited to crops commonly grown in the county. They are suited to special crops and to pasture and hay plants that can tolerate seasonal wetness.

A seasonally high water table is the dominant limitation to cultivated crops. Tile drains help to lower the water table and make farm work easier. Row crops can be grown year after year if optimum management is used. These soils generally are too wet in spring for small grain, even if they are drained. The Sebring soil is especially susceptible to surface crusting.

CAPABILITY UNIT IIIw-3

The soils in this unit are nearly level to gently sloping and are somewhat poorly drained. They have a silt loam plow layer and are in the Caneadea, Mahoning, and Mitiwanga series. These soils have a rooting zone that is mostly moderately deep. Available moisture capacity is medium, and permeability is moderate to very slow. These soils are saturated in winter and spring. Reaction in the rooting zone is strongly acid, and the soils have a medium capacity to store and release plant nutrients.

These soils dry slowly in spring and are wet for long periods unless drained. Artificial drainage helps to remove excess water and makes farm work easier. The

soils are suited to row crops and forage crops if they are drained. They are poorly suited to special crops.

A seasonally high water table is the dominant limitation to farming these soils. Good tilth is difficult to maintain unless optimum management is used, and erosion is a hazard if the gently sloping areas are cultivated. Row crops can be grown frequently on these soils if optimum management is used. Continuous cultivation commonly results in the deterioration of favorable soil structure, and tillage or grazing when the soils are wet causes soil compaction and reduced growth of crops. A thick plant cover on the gently sloping soils helps to control erosion in pasture and meadow.

CAPABILITY UNIT IIIw-4

This unit consists of nearly level to gently sloping, somewhat poorly drained soils that have a silt loam plow layer and a dense, compact fragipan in the subsoil. These soils are in the Wadsworth series. They have a moderately deep rooting zone and medium available moisture capacity. Reaction is very strongly acid. Permeability is slow, and water moves laterally through the soil above the fragipan in significant amounts in winter and spring. The soil above the fragipan is seasonally saturated. The soils have a medium capacity to store and release plant nutrients.

These soils dry slowly in spring and are wet for long periods unless they are drained. Artificial drainage is beneficial to crops, and it improves the timeliness of tillage. In drained areas these soils are suited to the cultivated crops commonly grown in the county. They are suited to forage crops that can tolerate seasonal wetness, but they are poorly suited to most special crops.

A seasonally high water table is the major limitation to farming, and erosion is a hazard in cultivated areas of the gently sloping soil. Row crops can be grown frequently, even year after year, if optimum management is used. Surface crusting is a concern, and good tilth deteriorates if cultivation is intensive. Tillage and grazing when the soils are wet cause soil compaction and reduce the growth of crops. A thick plant cover in pasture and meadow helps to control erosion on the gently sloping soil.

CAPABILITY UNIT IIIw-5

This unit consists of dark-colored, very poorly drained organic soils. These soils are in the Carlisle, Linwood, and Willette series. They have a moderately deep to deep rooting zone in drained areas or when the water table is low in summer. Available moisture capacity is medium to very high. Permeability ranges from moderately rapid to slow. The soils have a high capacity to store and release plant nutrients. The muck part of these soils is medium acid.

These soils generally are swampy unless they are drained. They collect surface and subsurface water from adjacent soils and are subject to ponding. The muck is soft and unstable. The soils are well suited to field crops and special crops if they are drained and managed at a very high level. Excessive drainage of the muck causes excessive subsidence. Soil blowing is a concern if the surface becomes too dry in cultivated areas, and areas of dried muck are susceptible to damage by fire. Drainage outlets are difficult to establish in some places because the soils are in a low topographic position.

Row crops and special crops can be grown year after year if very intensive management is used. Less intensive management causes excessive damage to the muck or unsatisfactory crop growth. Frost damage is a concern because the soils occupy low-lying pockets, and weed control is a special problem. Undrained areas are poorly suited to pasture because sedges and other swamp vegetation are dominant.

CAPABILITY UNIT IIIw-6

The only soil in this unit is Lorain silty clay loam. This soil is dark colored, nearly level, and very poorly drained. It has a deep rooting zone only in drained areas or in summer when the water table is low. Available moisture capacity is high, and permeability is slow. Reaction is slightly acid to neutral. This soil has a high capacity to store and release plant nutrients.

Undrained areas of this soil generally are too wet for farming. The soil dries slowly in spring unless drained, and it collects runoff from adjacent soils and is subject to ponding. Drained areas are suited to cultivated crops commonly grown in the county and are suited to forage crops and some special crops.

A seasonally high water table is a severe limitation to cultivated crops. Drainage outlets are difficult to establish in some places because the soil occupies low areas relative to nearby drainageways. This soil can be tilled only within a narrow range of moisture content. It is not susceptible to damaging surface crusting, but the surface layer becomes cloddy if it is tilled when too wet. Row crops can be grown year after year on this soil if optimum management is used. Tillage or grazing when the soil is wet causes soil compaction and reduces growth of plants.

CAPABILITY UNIT IVe-1

This unit consists of moderately steep soils that are well drained or moderately well drained. These soils are in the Chili, Dekalb, Glenford, Loudonville, and Wooster series. They have a surface layer of loam, gravelly loam, silt loam, or sandy loam. They have a moderately deep to deep rooting zone and low to medium available moisture capacity. Some of the soils are rapidly permeable, some are moderately permeable, and some are slowly permeable. Reaction is very strongly acid or strongly acid. Most of the soils have a low capacity to store and release plant nutrients, but the Wooster soils have a medium capacity.

Soils in this unit dry out and warm early in spring. They are suited to the cultivated crops and forage crops commonly grown in the county, but they are not well suited to special crops.

The hazard of erosion is very severe if these soils are used for cultivated crops, and some of the soils in the unit are already moderately eroded. The moderately eroded soils have poorer tilth, a lower organic-matter content, and generally a lower level of fertility than the uneroded soils. The soils generally are droughty. Row crops can be grown on all of the soils occasionally if optimum management is used. Erosion is difficult to control if cultivation is frequent or continuous. A thick plant cover in pasture and meadow helps to control erosion.

CAPABILITY UNIT IVe-2

The soils in this unit are moderately steep and moderately well drained. They have a silt loam plow layer and a dense fragipan in the subsoil. These soils are in the Rittman series. They have a moderately deep rooting zone and medium available moisture capacity. Permeability is slow. The reaction in the rooting zone is very strongly acid. These soils have a medium capacity to store and release plant nutrients.

Although they are only moderately well drained, these soils dry out quite rapidly in spring. They are saturated for short periods in winter and spring, but they have very rapid surface drainage, and internal water drains laterally above the fragipan. The soils are suited to the cultivated crops and forage crops commonly grown in the county but are poorly suited to special crops.

The hazard of erosion is very severe in cultivated areas. Some of the soils are already moderately eroded and are more droughty and less favorable for plant growth than the uneroded soils. Row crops can be grown occasionally on these soils if optimum management is used. The tilth of cultivated areas is generally poor.

Erosion is commonly excessive if row crops are grown from year to year. A thick plant cover in pasture and meadow helps to control erosion.

CAPABILITY UNIT IVe-3

The soils in this unit are sloping and moderately well drained. They have a silt loam plow layer and a subsoil that is clayey enough to inhibit root development. The soils are in the Ellsworth and Geeburg series. They have a moderately deep rooting zone and medium available moisture capacity. Permeability is slow, and reaction is medium acid or strongly acid in the rooting zone. The soils have a medium capacity to store and release plant nutrients.

These soils dry more slowly in spring than other similar soils. They are saturated for short periods in winter and spring but do not require artificial drainage. Random drainage is beneficial, however, when seep spots persist. These soils are suited to cultivated crops and forage plants commonly grown in the county. Without intensive management, they are not well suited to special crops.

A very severe hazard of erosion is the major limitation to using these soils for cultivated crops. Some of the soils are moderately eroded and have a sticky plow layer that makes tillage more difficult than on uneroded soils. They also require more attention to fertilizing practices. Row crops can be grown occasionally if optimum management is used, but if row crops are grown too frequently, erosion is difficult to control. A thick plant cover in pasture and meadow helps to control erosion.

CAPABILITY UNIT IVw-1

The soils in this unit are nearly level and poorly drained. They have a silt loam or silty clay loam plow layer and a subsoil that has a fairly high content of clay. These soils are in the Canadice and Trumbull series. They have a moderately deep rooting zone and medium available moisture capacity. Permeability is very slow, and the soils are saturated in winter and early in spring. Reaction is strongly acid to very strongly acid in the rooting zone. The soils have a medium capacity to store and release plant nutrients.

These soils dry very slowly in spring. Surface runoff is slow to ponded, and drainage by tile is slow. Drained areas are suited to some cultivated crops and to pasture and hay plants that can tolerate soil wetness. Even if they are drained, the soils are commonly too wet in winter and spring for winter wheat. They are poorly suited to special crops.

Seasonal wetness and very slow permeability cause a very severe limitation of wetness for cultivated crops, and tillage operations are commonly delayed for this reason. The soils generally have poor tilth because they are high in silt content and are very susceptible to crusting. Cultivation year after year commonly causes deterioration in soil structure and reduces growth of crops unless optimum management is used. The use of hay or pasture crops helps to maintain good tilth. Tillage and grazing when the soils are wet causes soil compaction and reduces growth of crops.

CAPABILITY UNIT VIe-1

This unit consists of moderately steep to very steep, well-drained soils. These soils are loamy throughout and contain varying amounts of coarse fragments. They are in the Chili, Conotton, Dekalb, Loudonville, Oshtemo, and Wooster series. They have a moderately deep rooting zone and a medium to very low available moisture capacity. Permeability is moderate to rapid. Reaction in the rooting zone is very strongly acid or strongly acid, and the soils have a wide range of capacity to store and release plant nutrients.

These soils warm up and dry readily in spring, and they are droughty in summer. They are not well suited to cultivated crops or special crops, but they are suited to deep-rooted hay and pasture plants.

The hazard of erosion is severe unless a thick plant cover is maintained. Erosion is difficult to control if the soils are tilled or disturbed for any reason. Some of the soils are too steep for safe operation of farm machinery.

CAPABILITY UNIT VIe-2

This unit consists of moderately steep to steep, moderately well drained soils that have a thin silt loam surface layer over a slowly permeable subsoil. These soils are in the Ellsworth, Geeburg, and Rittman series. They have a moderately deep to shallow rooting zone and medium to low available moisture capacity. Permeability is slow, and reaction is very strongly acid to medium acid. The soils have a medium capacity to store and release plant nutrients.

These soils are seasonally wet for short periods. They are all moderately eroded and have poor tilth. They tend to be droughty in summer. These soils are not suited to row crops or special crops, because of slope and the effects of erosion. They are suited to grasses and legumes for hay or pasture.

The hazard of erosion is severe on these soils unless a thick plant cover is maintained. Erosion is difficult to control in areas newly seeded to grass and legumes.

CAPABILITY UNIT VIIe-1

This unit consists of soils and miscellaneous land types that are very steep and well drained or moderately well

drained. The soils are in the Berks, Conotton, Dekalb, Ellsworth, and Oshtemo series. The land types are Rough broken land, clay and silt; Rough broken land, silt and sand; and Shale rock land. These soils and land types have a wide range of rooting depths, permeability, available moisture capacity, and natural fertility. Very steep slopes limit use to grazing of native grasses. The soils and land types are better suited to trees than to other crops. Soil slippage is a hazard in some places, and the hazard of erosion is very severe unless a thick plant cover is maintained. Operating farm machinery on these very steep soils is hazardous.

Estimated Yields

Table 1 shows estimated yields of the principal crops grown on the soils in the county. Yields for these crops are given for two levels of management, improved management and optimum management. The yields given in columns A reflect improved management, and those in columns B reflect optimum management. Irrigation has not been considered in these estimates.

The yields in columns B can be obtained by farmers who apply the best and latest information on soil management. An optimum level of management includes: (1) practices that assure that the water relationship within the soil is optimum for crop growth; (2) measures that increase the intake of water and the available water capacity of the soils and that correct excess water problems; (3) use of appropriate erosion control practices where erosion is a concern; (4) appropriate tillage practices that include plowing, seedbed preparation, and weed and insect control adapted to the soil conditions and the crop to be grown; (5) maintaining fertility and the reaction of the soil at an optimum level and applying trace elements as needed; (6) use of adapted high-yield crop varieties; and (7) assurance that all farm practices are timely.

Under an improved level of management, one or more of the basic practices used under optimum management are not applied or are inadequately applied.

These estimated yields are not static values but indicate the productive capacity of the soils. The yield level is influenced by soil characteristics. It indicates how desirable these characteristics are for crop production. Consequently, a relative position for any soil is evident if its yield level is compared to that of other soils in the county. The yield levels are likely to change as research opens new areas in production technology, but the relative position of the soils, one to another, is not so likely to change.

The estimates in table 1 are based mainly on interviews with farmers and on observations and field trials by the County Agricultural Extension and District Conservationist of the Soil Conservation Service. Also used are direct observations by members of soil survey party. The yield estimates are intended to show the differences in production over a period of years under the two broadly defined levels of management.

The figures listed in table 1 do not apply directly to any specific field for any particular year, because management practices vary from farm to farm, and weather conditions vary from year to year. The estimates are intended only as a general guide to the relative productivity of the soils and as an indication of how crops on these soils respond to different levels of management.

Use of the Soils for Woodland

About 12 percent of Summit County is wooded. The character of these woods has been changed drastically by cutting, pasturing, and burning during the past 175 years. A description of the forest cover at the time of the earliest surveys is reported by Gordon (*6*) and is briefly summarized in this survey in the section "Factors of Soil Formation."

Farm woodlots account for most of the acreage of tree cover; the steepest or wettest parts of the farms typically remain wooded. These areas commonly are pastured and have trees of poor quality. Some old sugarbush remains but is not being used. Clear cutting of some of the best stands of white oak and maple has occurred during recent years. Fairly extensive wooded tracts occur along the Cuyahoga River, a share of which is owned by State or metropolitan parks. These areas are extremely rugged and difficult to manage for timber production.

Reforestation on eroded soils of abandoned farms has increased the acreage of coniferous trees during the last 20 to 25 years. White, red, and Austrian pines are most commonly used for planting. These plantings have increased the value of the land for future development of suburban homesites or estates.

Generally, land use practices have relegated woodland to the poorer sites in the county. Carlisle, Lorain, Luray, Olmsted, and other of the most poorly drained soils have mixed stands of elm, red maple, willow, and ash. On the poorly drained Trumbull, Canadice, Sebring, and Damascus soils, stands of pin oak are prominent and some beech is intermixed.

Beech, maple, black oak, and a few white oak grow on the somewhat poorly drained to moderately well drained soils on uplands, such as the Mahoning, Ellsworth, Wadsworth, Rittman, Ravenna, and Canfield soils. A few stands where white oak is dominant are still present. Mixed stands of beech, maple, tulip-poplar (yellow-poplar), oak, black cherry, and dogwood are found on the well-drained soils, such as the Wooster, Chili, Loudonville, and Wheeling. Wild grapevine grows very well on these better drained soils and creates a problem of competition.

Species similar to those on the well-drained soils generally grow on the northern and eastern exposures of the very steep soils. Where the exposure is south or west, the dominant species are black oak, hickory, and white oak.

Plant cover in most areas that revert naturally to woodland is a succession of grass, blackberry, and hawthorn followed by mixed forest consisting mainly of black cherry, red maple, hickory, elm, white ash, dogwood, sassafras, spicebush, blue beech, ironwood, and, in some places, black locust. The eroded soils revert more slowly to woodland, and the trees are less desirable than those on uneroded soils.

Soil scientists and woodland specialists have studied woodland soils in Ohio for more than 10 years. Based on the data they have gathered, estimates have been made about the potential productivity of the soils in

TABLE 1.—*Estimated average acre yields of principal crops under two levels of management*

[Yield estimates in columns A are based on improved management, and estimates in columns B are based on optimum management. Absence of a yield figure indicates that the crop is not commonly grown at the level of management indicated or that the soil is not suited to the crop. Miscellaneous land types and soils not considered suitable for crops are not listed in this table]

Soil	Corn		Wheat		Oats		Legume-grass hay [1]	
	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*
Bogart loam, 0 to 2 percent slopes	85	100	30	45	60	80	3.0	4.5
Bogart loam, 2 to 6 percent slopes	85	100	30	45	60	80	3.0	4.5
Bogart-Haskins loams, 2 to 6 percent slopes	75	100	30	45	55	75	2.5	4.0
Canadice silty clay loam	50	75	20	30	45	60	1.5	2.5
Caneadea silt loam, 0 to 2 percent slopes	60	85	25	35	50	70	2.5	3.5
Caneadea silt loam, 2 to 6 percent slopes	60	85	25	35	50	65	2.5	3.5
Canfield silt loam, 0 to 2 percent slopes	70	100	30	45	60	75	3.0	4.0
Canfield silt loam, 2 to 6 percent slopes	70	100	30	45	60	75	3.0	4.0
Canfield silt loam, 6 to 12 percent slopes	65	90	25	40	55	75	3.0	4.0
Canfield silt loam, 6 to 12 percent slopes, moderately eroded	60	80	20	35	50	70	2.0	3.5
Canfield silt loam, sandstone substratum, 2 to 6 percent slopes	70	100	26	40	60	75	3.0	4.0
Carlisle muck	80	120	------	------	------	------	------	------
Chagrin silt loam	80	120	35	45	60	80	3.0	4.5
Chagrin silt loam, alkaline	90	130	35	45	60	80	3.5	4.5
Chili loam, 0 to 2 percent slopes	75	95	30	40	60	80	3.0	4.5
Chili loam, 2 to 6 percent slopes	70	90	30	40	60	80	3.0	4.5
Chili loam, 6 to 12 percent slopes	60	85	25	40	60	80	3.0	4.5
Chili gravelly loam, 6 to 12 percent slopes, moderately eroded	50	80	25	40	50	75	2.5	4.0
Chili gravelly loam, 12 to 18 percent slopes, moderately eroded	------	70	15	30	30	50	2.5	3.5
Chili silt loam, 0 to 2 percent slopes	80	100	35	45	60	80	3.0	4.5
Chili silt loam, 2 to 6 percent slopes	75	100	35	45	60	80	3.0	4.5
Chili silt loam, 6 to 12 percent slopes	65	90	30	40	60	80	3.0	4.5
Chili-Wooster complex, 6 to 12 percent slopes, moderately eroded:								
Chili part	60	85	25	40	60	80	3.0	4.5
Wooster part	60	90	25	45	50	75	3.0	4.0
Chili-Wooster complex, 12 to 18 percent slopes, moderately eroded:								
Chili part	------	70	15	30	30	50	2.5	3.5
Wooster part	50	85	20	40	50	70	2.5	3.5
Chili-Wooster complex, 18 to 25 percent slopes, moderately eroded:								
Chili part	------	------	------	------	------	------	2.0	3.0
Wooster part	------	------	------	------	------	------	2.0	3.0
Conotton-Oshtemo complex, 12 to 18 percent slopes	------	------	------	------	------	------	1.0	2.5
Conotton-Oshtemo complex, 18 to 25 percent slopes	------	------	------	------	------	------	1.0	2.0
Damascus loam	50	80	25	35	50	65	1.5	3.0
Dekalb sandy loam, 6 to 12 percent slopes	55	80	22	30	45	60	1.5	2.5
Dekalb sandy loam, 12 to 18 percent slopes	50	70	18	28	40	55	1.5	2.0
Dekalb sandy loam, 18 to 25 percent slopes	------	------	------	------	------	------	1.0	2.0
Ellsworth silt loam, 2 to 6 percent slopes	60	90	30	40	55	70	2.5	3.5
Ellsworth silt loam, 6 to 12 percent slopes	55	80	25	35	55	70	2.5	3.5
Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded	50	75	20	30	50	65	2.0	3.5
Ellsworth silt loam, 12 to 25 percent slopes, moderately eroded	------	------	------	------	------	------	1.5	3.0
Ellsworth silt loam, sandstone substratum, 2 to 6 percent slopes	60	90	30	40	55	70	2.5	3.5
Ellsworth silt loam, sandstone substratum, 6 to 12 percent slopes	55	80	25	35	55	70	2.5	3.5
Fitchville silt loam, 0 to 2 percent slopes	70	100	25	35	55	70	2.0	3.5
Fitchville silt loam, 2 to 6 percent slopes	70	100	30	40	55	70	2.5	3.5
Frenchtown silt loam	50	80	25	35	40	60	1.5	3.0
Geeburg silt loam, 2 to 6 percent slopes	60	90	20	40	55	70	2.0	3.0
Geeburg silt loam 6 to 12 percent slopes, moderately eroded	55	80	25	35	55	70	2.0	3.0
Geeburg silt loam, 12 to 18 percent slopes, moderately eroded	------	------	------	------	------	------	1.5	2.5
Glenford silt loam, 0 to 2 percent slopes	70	110	35	50	60	80	3.0	4.0
Glenford silt loam, 2 to 6 percent slopes	70	110	35	50	60	80	3.0	4.0
Glenford silt loam, 6 to 12 percent slopes, moderately eroded	60	90	20	35	50	65	2.5	3.5

See footnote at end of table.

TABLE 1.—*Estimated average acre yields of principal crops under two levels of management*—Continued

Soil	Corn		Wheat		Oats		Legume-grass hay [1]	
	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*
Glenford silt loam, 12 to 18 percent slopes, moderately eroded	50	80	15	30	40	50	2.5	3.5
Haskins-Caneadea complex, 2 to 6 percent slopes:								
Haskins part	60	90	25	35	50	70	2.5	3.5
Caneadea part	60	85	25	35	50	65	2.5	3.5
Holly silt loam	50	100	15	25	55	75	1.5	3.5
Holly silt loam, alkaline	50	100	15	25	55	75	1.5	3.5
Jimtown loam, 0 to 2 percent slopes	70	100	25	35	50	70	2.5	4.0
Jimtown loam, 2 to 6 percent slopes	70	100	30	40	50	70	2.5	4.0
Linwood muck	80	110						
Lobdell silt loam	80	120	30	40	60	80	3.0	4.5
Lorain silty clay loam	70	110	30	40	55	75	2.5	4.0
Loudonville silt loam, 2 to 6 percent slopes	70	100	35	45	55	75	3.0	4.5
Loudonville silt loam, 6 to 12 percent slopes	65	100	30	45	55	75	3.0	4.5
Loudonville silt loam, 6 to 12 percent slopes, moderately eroded	60	90	25	40	50	70	2.5	3.5
Loudonville silt loam, 12 to 18 percent slopes	50	80	20	35	50	70	2.5	3.5
Loudonville silt loam, 18 to 25 percent slopes							2.0	3.0
Luray silt loam	80	110	30	40	55	75	2.0	4.0
Mahoning silt loam, 0 to 2 percent slopes	60	90	25	35	40	60	1.5	3.0
Mahoning silt loam, 2 to 6 percent slopes	60	90	30	40	40	60	2.0	3.0
Mahoning silt loam, sandstone substratum, 2 to 6 percent slopes	60	90	25	35	40	60	2.0	3.0
Mitiwanga silt loam, 2 to 6 percent slopes	55	85	25	35	40	60	1.5	2.5
Olmsted loam	80	110	30	40	55	75	2.0	4.0
Orrville silt loam	75	105	25	35	50	70	2.5	4.0
Oshtemo sandy loam, 0 to 2 percent slopes	60	90	20	35	50	70	2.0	3.5
Oshtemo sandy loam, 2 to 6 percent slopes	60	90	20	35	50	70	2.0	3.5
Oshtemo sandy loam, 6 to 12 percent slopes	50	80	15	30	30	50	1.5	2.5
Ravenna silt loam, 0 to 2 percent slopes	55	95	20	40	50	75	2.5	3.5
Ravenna silt loam, 2 to 6 percent slopes	60	95	25	45	50	75	2.5	3.5
Rittman silt loam, 2 to 6 percent slopes	60	85	25	40	50	70	2.5	3.5
Rittman silt loam, 6 to 12 percent slopes	55	80	25	40	45	70	2.5	3.5
Rittman silt loam, 6 to 12 percent slopes, moderately eroded	50	70	20	35	40	65	2.0	3.0
Rittman silt loam, 12 to 18 percent slopes		70	20	35	30	50	2.0	3.0
Rittman silt loam, 12 to 18 percent slopes, moderately eroded		70	15	30	20	40	1.5	3.0
Rittman silt loam, 18 to 25 percent slopes, moderately eroded							1.5	2.5
Rittman silt loam, sandstone substratum, 2 to 6 percent slopes	60	100	25	40	50	70	2.5	3.5
Rittman silt loam, sandstone substratum, 6 to 12 percent slopes	55	95	25	40	45	70	2.5	3.5
Sebring silt loam		80	20	30	40	65	1.5	3.0
Sloan silt loam	70	110	25	40	50	75	2.0	4.0
Tioga loam	80	110	35	45	60	80	3.0	4.5
Trumbull silt loam		75	20	30	30	50	1.5	2.5
Wadsworth silt loam, 0 to 2 percent slopes	50	85	20	30	45	65	2.0	3.5
Wadsworth silt loam, 2 to 6 percent slopes	55	90	25	35	45	65	2.0	3.5
Wallkill silt loam	50	100	15	25	45	70	2.0	3.5
Wheeling silt loam, 0 to 2 percent slopes	80	110	35	50	60	85	3.5	4.5
Wheeling silt loam, 2 to 6 percent slopes	75	110	35	50	60	80	3.5	4.5
Willette muck	70	110						
Wooster silt loam, 2 to 6 percent slopes	80	110	35	50	60	80	3.5	4.0
Wooster silt loam, 6 to 12 percent slopes	70	100	30	45	50	75	3.0	4.0
Wooster silt loam, 6 to 12 percent slopes, moderately eroded	60	90	25	45	50	75	3.0	4.0
Wooster silt loam, 12 to 18 percent slopes	60	90	20	40	50	70	2.5	4.0
Wooster silt loam, 12 to 18 percent slopes, moderately eroded	50	85	20	40	50	70	2.5	3.5
Wooster silt loam, sandstone substratum, 6 to 12 percent slopes, moderately eroded	60	95	25	45	50	75	3.0	4.0
Wooster silt loam, sandstone substratum, 12 to 18 percent slopes, moderately eroded	50	90	20	40	50	70	2.0	3.5

[1] Pasture yields are not given in this table. Cow-acre-days of pasture can be easily figured by the following procedure: Convert tons of hay to pounds (multiply tons×2000). Divide the total pounds by 40. The answer is expressed as a number of cow-acre-days.

Summit County for woodland use and about limitations for this use.

Woodland suitability groups

In table 2, most of the soils in the county are placed in 13 woodland suitability groups. Each group is made up of soils that are similar in potential productivity for trees, have about the same suitability for trees, and require about the same management. The soils in each group are designated by their map symbols. The woodland group assigned to any soil is listed in the "Guide to Mapping Units" at the back of this survey and at the end of the description of that soil in the section "Descriptions of the Soils."

Each woodland group is identified by a three-part symbol, such as 1o1, 2w2, or 3r1. The first part of the symbol is a number that indicates relative potential productivity of the soils in the group; 1 means very high; 2, high; 3, moderately high; 4, moderate; and 5, low. These ratings are based on field determinations of average site indexes.

The second part of the symbol identifying a woodland group is a small letter. Except for the letter *o*, this letter indicates an important soil property that imposes a moderate or severe hazard or limitation that affects managing the soils of the group for trees. The letter *o* shows that the soils have few limitations that restrict their use for trees. The letter *c* indicates that the main limitation is the kind or amount of clay in the upper part of the soils of the group; *d* means that rooting depth is restricted because the soils are shallow to a hardpan, to hard rock, or to some other restrictive material; *f* denotes that the main limitation is a large amount of fragments in the soil that are more than 2 millimeters in size; *r* shows that the main limitation is steep slopes; *s* indicates that the soils are sandy and dry, have little or no difference in texture between the surface layer and subsoil, have low moisture-holding capacity, and generally have a low supply of plant nutrients; *t* denotes that the soils are excessively alkaline, excessively acid, or contain sodium salts or other toxic substances in amounts that limit or impede tree growth; *w* means that water in or on the soil, whether seasonally or year round, is the chief limitation, and *x* shows that stones or rocks in and on the soils are the chief limiting factor.

The last part of the symbol, another number, merely differentiates one woodland suitability group from others that have identical first and second parts in their identifying symbol. For example, the last number in the symbol *1o1* differentiates the woodland suitability group bearing the last number from all other groups having *1o* as the first two parts of their identifying symbol.

The terms used in table 2 are explained in the following paragraphs.

Potential productivity refers to the relative expected capacity of a soil to produce wood for economic use in quantitative terms. This capacity is expressed as site index, which is the height of dominant and codominant trees at age 50 years (*10*).

Erosion hazard refers to the relative vulnerability of a soil to water erosion, once its protective cover has been removed. Ratings are based upon differences in soil characteristics that relate to surface runoff and erosion,

TABLE 2.—*Potential productivity, hazards and limitations affecting*

[The Urban land part of the soil complexes that contain Urban land (CfB, CfC, Cm, CuB, CuC, EuB,

Woodland suitability groups, soil series, and map symbols	Potential productivity		Erosion hazard	Equipment limitations	Seedling mortality
	Species	Site index [1]			
Group 1o1: Canfield: CdA, CdB, CdC, CdC2, CeB, CfB, CfC. Chagrin: Ch, Ck, Cm. Glenford: GfA, GfB, GfC2, GoB, GoC. Lobdell: Le. Tioga: Tg. Wheeling: WrA, WrB. Wooster: WuB, WuC, WuC2, WvC2.	Upland oaks Tulip-poplar Sugar maple	85 85 85	Slight	Slight	Slight
Group 1r1: Glenford: GfD2. Wooster: WuD, WuD2, WuE2, WuF2, WvD2, WwD.	Upland oaks	85–95	Moderate	Moderate	Slight
Group 2c1: Geeburg: GbB, GbC2, GbD2.	Upland oaks	75–85	Slight	Moderate	Slight
Group 2o1: Bogart: BgA, BgB, BhB. Chili: CnA, CnB, CnC, CoC2, CpA, CpB, CpC, CuB, CuC, CwC2. Loudonville: LoB, LoC, LoC2, LuC.	Upland oaks	75–85	Slight	Slight	Slight

See footnote at end of table.

such as the "K factor" (tons of soil loss per acre per unit of rainfall for a slope of specified dimensions) and steepness of slope. The rating is *slight* if no special practices are needed. The rating is *moderate* if some attention must be given to erosion control and if woodland management is subject to moderate restrictions as to methods and timing. The rating is *severe* if considerable attention must be given to erosion control procedures. Intensive treatments, specialized equipment, careful operating methods, and discretion in timing must all be applied in woodland management.

Equipment limitations refers to the relative difficulty of using the machines commonly needed in woodland management. Ratings are based upon differences in soil characteristics that would limit equipment operations; these include soil texture, contrasting horizonation, slope, wetness, rockiness, and stoniness. The rating is *slight* if equipment use is not restricted in kind or time of year. It is *moderate* if equipment use is moderately restricted by one or more of the soil properties just mentioned, and it is *severe* if special equipment is needed to overcome the difficulties presented by one or more of the soil properties.

Seedling mortality refers to the degree of mortality to be expected among naturally occurring or artificially reestablished tree seedlings as influenced by kinds of soil or topographic conditions, assuming that plant competition is not a limiting factor. Soil characteristics that are known to contribute to this hazard are degree of internal drainage, effective rooting depth, surface texture, and aspect. The rating is *slight* if expected mortality is only 0 to 25 percent. It is *moderate* if expected mortality is 25 to 50 percent. Some replanting will be necessary. It is *severe* if mortality is expected to exceed 50 percent. Reinforcement planting may have to be made for 2 or 3 years, or special measures must be taken to insure adequate seedling survival.

Plant competition refers to the relative difficulty that desired seedlings are expected to encounter from other plants while they attempt to emerge into a dominant position. Separate ratings are made for broad-leaved tree species and for conifers. Ratings are based upon differences in soil characteristics that relate to internal drainage and upon the measured productivity class. The rating is *slight* if competing vegetation will not prevent adequate natural regeneration, successful direct seeding, or development of planted seedlings. It is *moderate* if competing vegetation will delay, but not prevent, the establishment of a fully stocked normal stand of trees. It is *severe* if competing vegetation will prevent adequate regeneration unless intensive site preparations and follow-up maintenance practices are undertaken.

Windthrow hazard refers to the relative loss of crop trees to be expected from blowdown during high velocity winds. Ratings are based on differences in effective rooting depth and in wetness. The rating is *slight* if no loss of trees is expected from blowdown. It is *moderate* if some trees may blow down during extended periods of rain and high winds. A competent professional forester should be engaged to supervise thinnings and harvest cuttings in timber stands on these soils. The rating is *severe* if excessive blowdown of trees may be expected during extended rainy and windy periods and during periods of high-velocity winds. No thinnings should be

management, and preferred trees by woodland suitability groups

EuC, Fn, GoB, GoC, Ju, LuC, Mn, RuB, RuC, Wb, and WwD) is not suited to commercial woodland]

Plant competition for—		Windthrow hazard	Trees preferred—		Remarks
Conifers	Hardwoods		In existing stands	For planting	
Severe	Moderate	Slight	Red oak, white oak, black oak, tulip-poplar, white pine, black walnut, sugar maple, white ash.	White pine, black walnut, tulip-poplar, white ash, Norway spruce.	Chagrin, Lobdell, and Tioga soils are subject to flooding and are likely to have the most severe plant competition.
Severe	Moderate	Slight	Tulip-poplar, red oak, black oak, white oak, black walnut.	Tulip-poplar, black walnut, white pine.	
Severe	Moderate	Slight	Tulip-poplar, black walnut, red oak, white oak, white ash.	White pine, tulip-poplar, black walnut.	
Severe	Moderate	Slight	Tulip-poplar, black walnut red oak, white oak.	White pine, black walnut, tulip-poplar.	

TABLE 2.—*Potential productivity, hazards and limitations affecting*

Woodland suitability groups, soil series, and map symbols	Potential productivity		Erosion hazard	Equipment limitations	Seedling mortality
	Species	Site index [1]			
Group 2r1: Chili: CoD2, CwD2, CwE2. Dekalb: DkD, DkE, DkF. Loudonville: LoD, LoE. Rough broken land: Rv, Rw.	Upland oaks	75–85	Moderate	Moderate to severe.	Slight
Group 2w1: Canadice: Ca. Damascus: Da. Frenchtown: Fr. Holly: Ho, Hy. Lorain: Ln. Luray: Ly. Olmstead: Od. Orrville: Or. Sebring: Sb. Sloan: So. Trumbull: Tr. Wallkill: Wc.	Wetland oaks Upland oaks Tulip-poplar Sugar maple White pine	80–90 75–85 85–95 75–85 85–95	Slight	Severe	Severe
Group 2w2: Caneadea: CcA, CcB. Fitchville: FcA, FcB, Fn. Jimtown: JtA, JtB, Ju. Mahoning: MgA, MgB, MlB, Mn. Ravenna: ReA, ReB, Rn. Rittman: RsB, RsC, RsC2, RsD, RsD2, RsE2, RtB, RtC, RuB, RuC. Wadsworth: WaA, WaB, Wb.	Wetland oaks Upland oaks Tulip-poplar Sugar maple White pine	80–90 75–85 85–95 75–85 85–95	Moderate	Moderate	Moderate
Group 3f1: Berks: BeF. Conotton-Oshtemo complex: CyD, CyE, CyF.	Upland oaks	65–75	Moderate to severe.	Moderate to severe.	Moderate
Group 3o1: Dekalb: DkC. Ellsworth: ElB, ElC, ElC2, EsB, EsC, EuB, EuC.	Upland oaks Tulip poplar White pine	65–75 75–85 75–85	Slight	Slight	Slight
Group 3r1: Ellsworth: ElE2, ElF2.	Upland oaks	65–75	Severe	Severe	Slight
Group 3s1: Oshtemo: OsA, OsB, OsC.	Upland oaks	65–75	Slight	Slight	Moderate
Group 3w1: Haskins-Caneadea complex: HcB. Mitiwanga: MtB.	Upland oaks	65–75	Slight	Moderate	Slight
Group 4: Borrow pits: Bp. Carlisle: Cg. Clay pits and quarries: Cx. Gravel pits: Gp. Linwood: Ld. Made land, chemical waste: Ma. Made land, sanitary fill: Md. Shale rock land: Sc. Urban land: Ur. Willette: Wt. Not rated for commercial tree production.					

[1] Site index data are based upon a body of information gathered from individual soils in Ohio and adjoining states.

management, and preferred trees by woodland suitability groups—Continued

Plant competition for—		Windthrow hazard	Trees preferred—		Remarks
Conifers	Hardwoods		In existing stands	For planting	
Severe	Moderate	Slight	Tulip-poplar, black walnut, red oak, white oak, Virginia pine.	White pine, black walnut, tulip-poplar, Virginia pine, white pine.	DrE and DrF have a lower site index on southeast-facing and southwest-facing slopes than on north-facing slopes. Rv and Rw are subject to slippage.
Severe	Severe	Severe	White ash, red maple, pin oak, sweetgum, sycamore.	Tulip-poplar, black walnut, red maple, pin oak.	The soils in this group are subject to either flooding or ponding.
Severe	Severe	Moderate	Red oak, black oak, tulip-poplar, white ash, sugar maple, black walnut, red maple.	White pine, tulip-poplar, black walnut.	The nearly level soils in this group have slow to ponded runoff. Erosion is a severe hazard on RsD, RsD2, and RsE2.
Moderate	Slight	Slight	Red oak, white oak, black oak, tulip-poplar, black walnut.	White pine, Virginia pine, tulip-poplar.	BeF has a lower site index on southwest-facing slopes.
Moderate	Slight	Slight	Red oak, white oak, tulip-poplar, black walnut.	White pine, tulip-poplar, Virginia pine.	
Moderate	Slight	Slight	Red oak, white oak, tulip-poplar, black walnut, chestnut oak.	White pine, tulip-poplar, Virginia pine.	
Moderate	Slight	Slight	White oak, red oak, black oak.	White pine, red pine.	
Moderate	Slight	Slight	Red oak, white oak, black oak, tulip-poplar, black walnut, red maple.	White pine, tulip-poplar.	

attempted, and harvesting should be done only under the supervision of a competent professional forester.

Also listed in table 2 for each woodland suitability group are the trees that are preferred for management in the existing stands and the trees preferred for planting. The species are not listed in the order of preference. Desirability of species was determined by the commercial value of the species, and no noncommercial species are listed.

Use of the Soils for Wildlife

In table 3, most of the soils in Summit County are rated for their suitability for eight elements of wildlife habitat and for three broad classes of wildlife. More detailed information about the rating system is given in a paper by Allan, Garland, and Dugan (*1*). Not rated in table 3 are the land types and the complexes that include Urban land.

The information given in table 3 is useful in (1) broad planning for wildlife habitat in parks, wildlife refugees, nature study areas, and other recreational developments; (2) selecting soils that are most suitable as sites for creating, improving, or maintaining specific kinds of wildlife habitat elements; (3) determining the relative degree of management intensity required for individual habitat elements; (4) eliminating sites on which it is not feasible to manage for specific kinds of wildlife; and (5) determining areas that are suitable for acquisition and development as wildlife habitat.

The numerical ratings in table 3 are 1, 2, 3, and 4, each number indicating relative suitability. A rating of 1 denotes *well suited;* 2, *suited;* 3, *poorly suited;* and 4, *not suited.* Soils that are well suited have few limitations; those that are suited have moderate limitations, and those that are poorly suited have severe limitations. Not considered in the ratings are present land use, including the presence of artificial drainage, the location of a soil in relation to other soils, and the mobility of wildlife. Areas that are artificially drained are seldom used for development of wildlife habitat.

TABLE 3.—*Suitability of soils for elements of wildlife habitat and for kinds of wildlife*

[A rating of 1 denotes well suited; 2, suited; 3, poorly suited; and 4, not suited. Borrow pits (Bp), Clay pits and quarries (Cx), Gravel pits (Gp), Made land (Ma, Md), Shale rock land (Sc), Urban land (Ur), and the complexes that contain Urban land (CfB, CfC, Cm, CuB, CuC, EuB, EuC, Fn, GoB, GoC, Ju, LuC, Mn, Rn, RuB, RuC, Wb, and WwD) are not rated in this table]

Soil series and map symbols	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Ponds [1]	Openland wildlife	Woodland wildlife	Wetland wildlife
Berks: BeF	4	3	2	3	3	4	4	4	3	3	4
Bogart:											
BgA	2	1	1	1	3	3	3	3	1	1	3
BgB, BhB	2	1	1	1	3	3	4	4	1	1	4
For Haskins part of BhB, see Haskins series.											
Canadice: Ca	3	3	2	2	2	1	1	1	3	2	1
Caneadea:											
CcA	2	2	2	1	3	2	2	2	2	2	2
CcB	2	2	2	1	3	3	3	3	2	2	3
Canfield:											
CdA	2	1	1	1	3	3	3	3	1	1	3
CdB, CdC, CdC2, CeB	2	1	1	1	3	3–4	4	4	1	2	4
Carlisle: Cg	4	3	4	4	1	1	1	1	4	4	1
Chagrin: Ch, Ck	1	1	1	1	3	4	4	4	1	1	4
Chili:											
CnA, CpA	2	2	1	2	1	4	4	4	1	2	4
CnB, CnC, CoC2, CpB, CpC, CwC2	2	2	2	2	1	4	4	4	2	2	4
CoD2, CwD2, CwE2	3	2	2	3	1	4	4	4	2	3	4
For Wooster part of CwC2, CwD2, CwE2, see Wooster series.											

See footnote at end of table.

TABLE 3.—*Suitability of soils for elements of wildlife habitat and for kinds of wildlife*—Continued

Soil series and map symbols	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Ponds [1]	Openland wildlife	Woodland wildlife	Wetland wildlife
Conotton: CyD, CyE, CyF. For Oshtemo part of CyD, CyE, CyF, see Oshtemo series.	4	2	3	3	2	4	4	4	3	3	4
Damascus: Da	3	2	2	1	2	1	2	3–4	2	1	1–2
Dekalb:											
DkC	3	2	2	2	1	4	4	4	2	2	4
DkD, DkE, DkF	4	3	3	3	1	4	4	4	4	4	4
Ellsworth:											
ElB, EsB	2	1	1	1	3	3	3	3	1	1	3
ElC, ElC2, EsC	2	1	1	1	3	4	4	4	1	1	4
ElE2, ElF2	3–4	2	1	1	3	4	4	4	2–3	2	4
Fitchville:											
FcA	2	2	1	1	3	2	2	2	1	2	2
FcB	2	2	1	1	3	3	3	3	1	2	3
Frenchtown: Fr	3	3	2	2	2	1	1	1	3	2	1
Geeburg:											
GbB	2	2	2	1	3	3	3	3	2	2	3
GbC2	2	2	2	1	3	4	4	4	2	2	4
GbD2	3	2	2	1	3	4	4	4	2	2	4
Glenford:											
GfA	2	1	1	1	3	2	2	2	2	2	2
GfB	2	1	1	1	3	3	3	3	2	2	3
GfC2	2	1	1	1	3	4	4	3	2	2	4
GfD2	3	1	1	1	3	4	4	4	2	2	4
Haskins: HcB. For Caneadea part of HcB, see Caneadea series.	2	2	2	1	3	3	3	3	2	2	3
Holly: Ho, Hy	3	2	2	1	2	2	2	4	2	1	2
Jimtown:											
JtA	2	2	1	1	3	2	2	4	1	2	2
JtB	2	2	1	1	3	3	3	4	1	2	3
Linwood: Ld	4	3	4	4	1	1	1	1	4	4	1
Lobdell: Le	2	1	1	1	3	3	3	3	1	1	3
Lorain: Ln	4	3	3	1	1	1	1	1	3	1	1
Loudonville:											
LoB, LoC, LoC2	2	2	2	2	2	4	4	4	2	2	4
LoD, LoE	3–4	2	2	2	2	4	4	4	2	2	4
Luray: Ly	4	3	3	1	1	1	1	1	3	1	1
Mahoning:											
MgA	2	2	1	1	3	2	2	2	2	2	2
MgB, MlB	2	2	1	1	3	3	3	3	2	2	3
Mitiwanga: MtB	2	2	1	1	3	3	3	4	2	2	3
Olmsted: Od	4	3	3	1	1	1	1	3–4	3	1	1

See footnote at end of table.

TABLE 3.—*Suitability of soils for elements of wildlife habitat and for kinds of wildlife*—Continued

Soil series and map symbols	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Ponds [1]	Openland wildlife	Woodland wildlife	Wetland wildlife
Orrville: Or	2	2	1	1	3	2	2	3	1	2	2
Oshtemo: OsA, OsB, OsC	2	2	2	2	2	4	4	4	2	2	4
Ravenna:											
ReA	2	2	1	1	3	2	2	2	2	2	2
ReB	2	2	1	1	3	3	3	4	2	2	3
Rittman:											
RsB, RtB	2	1	1	1	3	3	4	4	1	1	4
RsC, RsC2, RtC	2	1	1	1	3	3–4	4	4	1	1	4
RsD, RsD2, RsE2	3–4	1	1	1	3	4	4	4	1–2	1	4
Rough broken land: Rv, Rw	4	3	2	1	3	4	4	4	3	2	4
Sebring: Sb	3	3	2	2	2	1	1	1	3	2	1
Sloan: So	4	3	3	1	1	1	2	4	3	1	2
Tioga: Tg	1	1	1	1	3	4	4	4	1	1	4
Trumbull: Tr	3	3	2	2	2	1	1	1	3	2	1
Wadsworth:											
WaA	2	2	1	1	3	2	2	2	2	2	2
WaB	2	2	1	1	3	3	3	4	2	2	3
Wallkill: Wc	4	3	3	1	1	1	1	1	3	1	1
Wheeling: WrA, WrB	1	1	1	1	3	4	4	4	1	1	4
Willette: Wt	4	3	4	4	1	1	1	1	4	4	1
Wooster:											
WuB, WuC, WuC2, WvC2	1	1	1	1	3	4	4	4	1	1	4
WuD, WuD2, WuE2, WuF2, WvD2	3–4	1	1	1	3	4	4	4	1–2	1	4

[1] All soils that have sandstone bedrock within a depth of 60 inches are rated 4.

The eight elements of wildlife habitat listed in table 3 are described in the following paragraphs.

Grain and seed crops.—These crops are corn, wheat, barley, oats, rye, buckwheat, and other seed-producing annuals. Soils well suited to these plants are deep, nearly level or very gently sloping, medium textured, well drained, and free or nearly free of stones. They have medium or high available moisture capacity and are not subject to frequent flooding. The soils can be safely planted to the named crops each year, but the soils that are not so well suited require more intensive management.

Grasses and legumes.—These plants are domestic grasses and legumes that are established naturally. Bluegrass, fescue, bromegrass, timothy, redtop, orchardgrass, reed canarygrass, clover, trefoil, alfalfa, and others are in this group. On soils that are rated well suited, many kinds of plants that are suited to the climate can be maintained in adequate stands for at least 10 years. The soils are well drained or moderately well drained and have medium or high available moisture capacity. Occasional flooding and surface stones are not serious concerns, for the soils are seldom tilled.

Wild herbaceous upland plants.—Perennial grasses and weeds that generally are established naturally make up this group. They include switchgrass, milkweed, daisies, goldenrod, strawberries, nightshade, and dandelion. Soils that are well suited to these plants vary widely in texture, drainage, and slope. If drainage ranges between good and somewhat poor, slope is not limiting. Stoniness and occasional flooding are not serious concerns.

Hardwood woody plants.—These plants are nonconiferous trees, shrubs, and woody vines that produce nuts or other fruits, buds, catkins, twigs, or foliage that wildlife eat. They are generally established naturally, but may be planted. Among the native kinds are oak, beech, cherry, maple, hickory, poplar, aspen, walnut, dogwood, roses, and briers. Soils well suited to these

plants are deep or moderately deep, medium textured or moderately fine textured, and moderately well drained to somewhat excessively drained. Slope and surface stoniness are of little significance.

Also in this group are several varieties of fruiting shrubs that are grown commercially for planting. Autumn-olive, Amur honeysuckle, Tatarian honeysuckle, crab apple, multiflora rose, and dogwood are some of the shrubs that generally are available and can be planted on soils that are rated well suited. Hardwoods that are not available commercially can commonly be transplanted successfully from a natural stand.

Coniferous woody plants.—These are cone-bearing, evergreen trees and shrubs that are used by wildlife primarily as cover, though they also provide browse and seeds. Among them are Norway spruce, white pine, arborvitae, redcedar, and juniper. Generally, the plants are established naturally in areas where the cover of weeds and sod is thin. The soils that are well suited to coniferous wildlife habitat are those that cause plants to grow slowly and delay closure of the canopy. It is important that branches be maintained close to the ground so that food and cover are readily available to rabbits, pheasants, and other small animals. If the trees quickly form a dense canopy that shuts out the light, the lower branches die.

On soils rated poorly suited for coniferous wildlife habitat, widely spaced plants may quickly but temporarily produce desired growth characteristics. The establishment or maintenance, however, is difficult because these soils are well suited to competing hardwoods. Unless the stand of conifers is carefully managed, hardwoods invade and commonly overtop the conifers.

Wetland food and cover plants.—Wild, herbaceous, annual and perennial plants that grow on moist to wet sites make up this group. They include smartweed, wild millet, rush, bulrush, spikerush, sedges, burreed, wildrice, buttonbush, rice cutgrass, and cattails. Soils that have a rating of well suited are nearly level and poorly drained or very poorly drained. Those that have a rating of suited are nearly level and somewhat poorly drained or frequently flooded. Depth, stoniness, and texture of the surface layer are of little concern.

Shallow water developments.—These are impoundments or excavations that provide areas of shallow water near food and cover for wetland wildlife. Examples of such developments are shallow dugouts, level ditches, blasted potholes, and devices that keep the water 6 to 24 inches deep in marshes. Soils that are rated well suited to this use are nearly level, more than 36 inches deep to bedrock, and poorly drained or very poorly drained. Soils that have a rating of suited are nearly level and somewhat poorly drained. They may be only 20 to 36 inches deep to bedrock.

Ponds.—Ponds, or excavated impoundments, are dugout water areas or a combination of these and impoundments behind low dikes in which the water is at a depth suitable for fish or wildlife. If fish are produced, part of the pond should be at least 8 feet deep. Soils that are rated well suited are nearly level, more than 8 feet deep, and poorly drained or very poorly drained. Slope generally determines the degree of difficulty involved in the construction of ponds. As slope increases, the difficulty is greater and the size of the pond that is feasible is smaller.

In table 3, the soils are also rated according to their suitability for three kinds of wildlife. For open-land wildlife the rating is based on the ratings shown for grain and seed crops, grasses and legumes, wild herbaceous upland plants, hardwood plants, and coniferous wildlife habitat. The rating for woodland wildlife is based on the ratings listed for all the elements except grain and seed crops. For wetland wildlife the rating is based on the ratings shown for wetland food and cover plants, shallow water developments, and excavated ponds.

The following paragraphs list the animals and birds in each of the three categories of wildlife listed in table 3.

Open-land wildlife.—Examples of openland wildlife are pheasant, quail, meadowlark, field sparrow, dove, cottontail rabbit, red fox, and woodchuck. These birds and mammals normally make their home in areas of cropland, pasture, meadow, and lawns, and in areas overgrown with grasses, herbs, and shrubs.

Woodland wildlife.—Among the birds and mammals that prefer woodland are ruffed grouse, woodcock, thrush, vireo, scarlet tanager, gray and fox squirrels, gray fox, white-tailed deer, raccoon, oppossum, and woodpecker. They obtain food and cover in stands of hardwoods, coniferous trees, shrubs, or in a mixture of these plants.

Wetland wildlife.—Duck, geese, rail, herons, shore birds, mink, and muskrat are familiar examples of birds and mammals that generally make their home in ponds, marshes, swamps, or other wet areas.

Each rating under "Classes of wildlife" in table 3 is based on the ratings listed for the habitat elements in the first part of the table.

Engineering Uses of the Soils [3]

Much of the information in this section is useful to engineers and others whose work involves the use of soil engineering data. Some properties of soils are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, facilities for water storage, erosion control structures, drainage systems, and sewage disposal systems. Among the properties most important to the engineer are permeability to water, compaction characteristics, drainage, shrink-swell characteristics, grain-size distribution, plasticity, and reaction. Depth to water table, depth to bedrock, slope, and available moisture capacity also are important.

Excess water in excavations is one of the most common concerns in construction work in Summit County. Soils that are wet and poorly drained occupy about 25 percent of the land area in the county. In the Holly, Sloan, Olmsted, Sebring, and other soils, ground water sometimes drains into an excavation so rapidly that slope and trench failures result. The water table in the Ravenna, Wadsworth, Mahoning, and other somewhat poorly drained soils is of lesser concern, especially in summer, than it is in the wetter soils that have water near the surface for long periods.

[3] LLOYD GILLOGLY, construction engineer, Soil Conservation Service, helped prepare this section.

Soils that are soft, compressible, and unstable impose severe limitations on construction of standard design (fig. 2). Soils that have these characteristics include Carlisle muck, Linwood muck, and Willette muck. Structures are commonly placed on pilings in these organic soils. The organic material commonly does not support even light-duty roads or pavements. Caneadea, Luray, Canadice, and other mineral soils also are unstable when they are saturated, as they contain a high proportion of mineral particles of only one size, either silt or clay.

Sandstone bedrock occurs near the surface of Dekalb and Loudonville soils. These soils are typically sloping or steep, and they present limitations to construction of pipelines and roads. Blasting is necesary in places to break up the rock in these soils.

Some of the soils in Summit County have clay properties that cause them to shrink and swell as the moisture content varies. The forces exerted during swelling are commonly great enough to cause cracking in foundation walls built of concrete blocks. Geeburg, Caneadea, Canadice, and Lorain soils have high shrink-swell potential, and Ellsworth, Mahoning, and Trumbull soils have moderate potential. These soils generally occur in the part of the county north of Akron. Building foundations in these soils require special design to withstand soil pressures and avoid possible foundation failure.

The soils in about 7,500 acres along the Cuyahoga Valley have severe limitations that affect their stability for nearly all types of construction. Very steep slopes on the highly sorted sands, and clays are subject to slippage and creep, especially during wet periods. Massive blocks of soil move slowly downslope in these wet periods. The hazard of erosion is severe if these soils are cleared for construction. The areas are shown on the detailed soil map as Rough broken land, clay and silt; Shale rock land; and Rough broken land, silt and sand. However, most of the other soils in the county that have slopes of more than 25 percent also are somewhat susceptible to slippage.

Two kinds of flooding can occur in the county. Some areas of low-lying soils act as catch basins for runoff from soils on uplands. Periods of high water are common on these low-lying soils, including the Canadice, Damascus, Lorain, Luray, Olmsted, and Sebring. Another kind of flooding occurs along most streams in the county, where a strip of soils is subject to stream overflow during periods of high rainfall. Among these soils are the Chagrin, Holly, Lobdell, Orrville, and Sloan, all of which have severe limitations for many uses because of flooding.

Figure 2.—**Railroad bed has settled where it crosses a pocket of unstable muck.**

Information in this survey can be used to—

1. Make soil and land use studies that will aid in selecting and developing light industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the engineereing properties of the soils in the planning of farm drainage systems, farm ponds, irrigation systems, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, airports, pipelines, and cables and in planning detailed investigations at the selected locations.
4. Locate probable sources of gravel and other construction materials.
5. Correlate performance of engineering structures with soil mapping units, and thus develop information that will be useful in designing and maintaining the structures.
6. Determine the suitability of soil mapping units for cross-country movement of vehicles and construction equipment.
7. Supplement the information obtained from other published maps and reports and aerial photographs to make maps and reports that can be readily used by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

It is not intended that this survey will eliminate the need for onsite sampling and testing of sites for design and construction of specific engineering works and uses. It does give information from which sites most likely to be favorable for the planned structure can be selected, and from which sites having severe hazards or limitations can be eliminated from further consideration.

The soil areas delineated on the maps at the back of this survey may, in some instances, contain inclusions of either similar or dissimilar soils. These inclusions are mentioned in the descriptions of mapping units provided in the sections "Descriptions of the Soils."

Much of the information in this section is given in tables 4, 5, and 6. Additional information useful to engineers can be found in other sections of this soil survey, particularly the sections "Descriptions of the Soils" and "Formation and Classification of the Soils."

Some of the terms used by the soil scientists may be unfamiliar to the engineer, and some words may have special meanings in soil science. Several of these terms are defined in the Glossary at the back of this survey.

Engineering classification systems

Two engineering classification systems are used in this soil survey. One is the system adopted by the American

Association of State Highway Officials (AASHO) (*2*). In this system soil materials are classified into seven groups based on load capacity and service. The best soil materials for road subgrades are classified as A-1; the poorest are classified as A-7. A within-group index ranging from 0 to 20 is a part of the system. The best subgrades within a group are indicated by 0, the poorest by 20. The indexes are shown in table 4 only.

Some engineers prefer to use the Unified soil classification system (*17*). In this system soil materials are classified on the basis of particle-size distribution and their Atterburg limits—plasticity index and liquid index. Soil materials are classified into one of 15 classes: eight representing coarse-grained material, six classes representing fine-grained material; and one class for highly organic soils. In this system an approximate classification of soils can be made in the field.

The soil classifications given in table 4 were determined by laboratory tests. Table 5 shows the estimated engineering classifications for all of the soils in the county.

Soil test data

Samples of eight profiles representing seven soil series in Summit County were tested according to standard procedures to help evaluate the soils for engineering purposes. The results of these tests are shown in table 4. The following paragraphs describe the data included in table 4.

Moisture-density data are given for the tested soils. If a soil material is compacted at successively higher levels of moisture content, assuming that the compacting effort remains constant, the density of a compacted material increases until the optimum moisture content is reached. After that the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed "maximum dry density." Moisture-density data are important in earthwork, for as a rule, optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

The mechanical analyses were made by combined sieve and hydrometer methods. Percentages of clay obtained by the hydrometer method are not used in naming USDA textural class for soil classification.

Tests for liquid limit and plastic limit measure the effect of water on the consistence of the soil material. As the moisture content of a soil increases from a very dry state, the material changes from a semisolid to a plastic state. As the moisture is further increased, the material changes from a plastic state to a liquid state. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is in a plastic condition. Some silty and sandy soils are nonplastic; that is, they will not become plastic at any moisture content.

Engineering properties of soils

Table 5 gives estimated properties of soils important in engineering and lists estimated AASHO and Unified classifications.

The estimated physical data shown in the table are based on the soil test data in table 4, on field experience, and on test data obtained from the same kinds of soils in other counties. The following paragraphs briefly describe the data given in table 5.

Depth to seasonally high water table refers to the shallowest depth at which the soil is saturated in winter and spring because of a water table. The water table may be a perched one or an ordinary ground water table. Soil conditions immediately after heavy precipitation are not considered. In all soils, particularly in the sloping soils on uplands, the depth to the water table is generally greater late in spring and in summer and fall than is indicated in this column.

The estimated depth to bedrock is based on observations made during the course of the survey. From place to place, however, the depth to bedrock varies considerably.

The depths given for the major layers in each soil correspond to significant differences in texture in the representative profile for each soil series. Soils that have a profile different from the representative profile have properties that differ from those shown.

In the column showing USDA texture, the textures indicated correspond to the dominant textures given in the technical description of each soil.

The engineering classifications are based on actual data from tests made in this county and other survey areas. The Unified and AASHO systems are described in the section "Engineering Classification Systems."

The columns showing percentage passing sieve give estimated particle-size distribution according to standard-size sieves.

Permeability values are estimates of the range in rates of downward water movement in the major soil horizons when they are saturated but allowed to drain freely; that is, saturated above a true water table. They are estimates based on soil texture, soil structure, porosity, infiltration tests, and observations of soil drainage. On any given soil, infiltration through the surface layer varies considerably according to land use and management as well as initial moisture conditions.

The available moisture capacity, expressed in inches per inch of soil depth, is the approximate amount of capillary water in the soil when wet to field capacity. When the soil is air dry this amount of water will wet the soil horizon described to a depth of 1 inch without deeper percolation. Available moisture capacity is a measure of the maximum amount of moisture a particular soil can store for use by plants. The estimated values listed are based on the difference in percent moisture retained at 1/3 and 15 atmospheres of tension for medium-textured and fine-textured soils. For sandy soils, the estimated values are based on the difference between 1/10 and 15 atmospheres of tension. The available moisture capacity in compact glacial till and fragipans is rated at a lower figure than normal for the given textures. This is a result of increased bulk densities in these layers, which greatly reduces the penetration of plant

TABLE 4.—*Soil*

Soil name, sample number, and location [1]	Parent material	Ohio report No.	Depth	Moisture density [2]: Maximum dry density	Moisture density [2]: Optimum moisture	Mechanical analysis [3]: Percentage passing sieve— 1 in.	Mechanical analysis [3]: Percentage passing sieve— ¾ in.
			Inches	*Lb./cu. ft.*	*Pct.*		
Bogart:							
ST-26, W. of Akron between Himelright Avenue and Interstate Highway No. 77. (Modal)	Loamy outwash.	--------	0-7	--------	--------	--------	--------
		--------	13-21	--------	--------	--------	--------
		--------	33-40	--------	--------	--------	--------
Canfield:							
ST-3, 3 miles SW. of Copley, 1,000 feet W. of Medina County Line Road and 300 feet N. of Copley-Norton Township line. (Finer textured than modal profile)	Loam glacial till.	9060	0-9	94. 6	24. 4	--------	--------
		9070	17-24	104. 7	19. 2	--------	100
		9071	29-40	114. 6	14. 6	86	86
		9072	40-60	109. 6	16. 9	--------	--------
ST-5, 1 mile W. of Turkeyfoot Lake, SW¼ sec. 14, Franklin Township, Portage Lakes State Park. (Modal)	Loam glacial till.	14073	0-8	102. 4	20. 3	--------	--------
		14074	13-20	112. 0	15. 8	--------	100
		14075	26-33	119. 3	12. 7	--------	--------
		14076	44-79	124. 2	11. 2	94	94
Fitchville:							
ST-1, 1.5 miles W. of Hudson Center and 750 feet S. of Boston Miles Road, Hudson Township. (Modal)	Lacustrine silt and clay.	9073	4-8	81. 1	32. 5	--------	--------
		9074	23-31	104. 7	19. 2	--------	--------
		9075	51-60	117. 0	13. 5	--------	--------
Glenford:							
ST-27, 0.75 mile SW. of Peninsula, 150 feet N. of Major Road, and 900 feet W. of intersection with Riverview Road. (Modal)	Lacustrine silt and clay.	--------	12-16	--------	--------	--------	--------
		--------	21-29	109. 0	16. 8	--------	--------
		--------	40-60	110. 5	15. 2	--------	--------
Mahoning:							
ST-1, 0.5 mile S. of Ohio Turnpike and 0.5 mile E. of Moran Road, Hudson Township. (Coarser textured than modal profile)	Clay loam glacial till.	14079	0-6	94. 6	24. 4	--------	--------
		14071	17-24	107. 1	18. 1	--------	100
		14072	46-50	112. 0	15. 8	--------	--------
Sebring:							
ST-10, 1,000 feet SE. of Lake Forest and 1,000 feet S. of Boston Mills Road, Hudson City limits. (Finer textured than modal profile)	Lacustrine silt and clay.	36058	22-30	107. 1	18. 1	--------	--------
		36059	52-62	107. 1	18. 1	--------	--------
Wooster:							
ST-14, 1 mile S. of Barberton, 400 feet S. of Eastern Road, and 150 feet E. of Fairland Road, Franklin Township (Modal)	Loam glacial till.	36060	18-30	117. 0	13. 5	100	100
		36061	42-55	117. 0	13. 5	--------	--------

[1] Samples numbered ST-1, ST-3, ST-5, ST-8, ST-10, and ST-14 were performed by the Ohio Department of Highways Testing Laboratory and samples numbered ST-26 and ST-27, by the Soil Physical Studies Laboratory, Ohio State University.
[2] Based on AASHO Designation T 99-57, Method A (*2*).
[3] Mechanical analyses according to the AASHO Designation T 88 (*2*). Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method

test data

Mechanical analysis [3]—Continued						Liquid limit	Plasticity index	Classification		
Percentage passing sieve—Continued					Percentage smaller than—					
3/8 in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.005 mm.			AASHO [4]	Unified [5]	Ohio [6]
						Pct.				
--------	----------	100	89	56	20	27	[7] NP	A-4	ML	--------
--------	----------	100	73	48	22	24	6	A-4	SM-SC	--------
--------	----------	100	46	25	14	[7] NP	(7)	A-1	SM	--------
100	98	94	90	82	28	35	8	A-4(8)	ML	A-4b
99	97	93	89	76	43	34	13	A-6(9)	CL	A-6c
83	82	80	78	69	28	26	6	A-4(7)	ML-CL	A-4a
--------	97	96	93	84	42	29	11	A-6(8)	CL	A-6a
--------	100	100	98	90	29	27	1	A-4(8)	ML	A-4b
94	85	81	78	61	32	29	9	A-4(5)	CL	A-4b
--------	100	100	96	78	38	24	6	A-4(8)	ML-CL	A-4b
92	87	82	73	44	25	20	4	A-4(2)	SM-SC	A-4b
--------	100	100	99	95	42	(7)	(7)	A-4(8)	ML	A-4b
--------	100	100	100	90	40	31	9	A-4(8)	ML-CL	A-4b
--------	100	100	99	64	26	23	5	A-4(6)	ML-CL	A-4c
--------	----------	100	99	97	33	42	14	A-7	ML	--------
--------	----------	100	99	97	32	42	17	A-7	ML-CL	--------
--------	----------	100	99	98	27	37	11	A-6	ML	--------
--------	100	100	96	77	33	35	11	A-6(8)	ML-CL	A-6a
99	96	91	87	76	51	39	17	A-6(11)	CL	A-6b
100	97	84	80	71	47	34	14	A-6(10)	CL	A-6a
--------	100	97	97	95	58	40	18	A-7-6	CL	A-7-6
--------	100	90	90	88	47	37	14	A-6	CL	A-6a
99	98	94	88	69	26	29	6	A-4	ML	A-4a
100	97	83	79	66	38	27	8	A-4	CL	A-4a

and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil except for the Bogart and Glenford soils analyzed by the pipette method at Ohio State University.

[4] Based on AASHO Designation M 145-49 (*2*).

[5] Based on the Unified soil classification system (*17*).

[6] Based on "Classification of Soils," Ohio State Highway Testing Laboratory, February 1, 1955.

[7] NP=Nonplastic.

TABLE 5.—*Estimated soil*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in referring to other series that appear in the first column of this table. Borrow pits (Bp), Clay pits and quarries (Cx), Gravel pits (Gp), that contain Urban land are too variable to be rated in this table. The sign < means less than, and the sign > means more than]

Soil series and map symbols	Depth to seasonally high water table	Depth to bedrock	Depth from surface	Classification			Coarse fraction greater than 3 inches
				USDA texture	Unified	AASHO	
	Feet	*Feet*	*Inches*				*Percent*
Berks: BeF	>3	1½–3½	0–12	Channery silt loam	SM, ML	A-2, A-4	1–20
			12–30	Very channery silt loam	GM, GP-GM	A-2	1–20
			30–60	Fractured siltstone bedrock.			
*Bogart: BgA, BgB, BhB. For Haskins part of BhB, see Haskins series.	1½–2½	>6	0–13	Loam	ML-CL, ML	A-4	
			13–40	Sandy loam and loamy sand.	SM, SM-SC, ML	A-2 or A-4	1–5
			40–60	Sand and sandy loam	SW-SM, SM	A-1 or A-2	1–5
Canadice: Ca	0–½	>6	0–9	Silty clay loam	CL, CH	A-6, A-7	
			9–38	Silty clay	CL, CH	A-7	
			38–60	Silty clay	CL, CH	A-7	
Caneadea: CcA, CcB	½–1½	>6	0–7	Silt loam	ML, ML-CL	A-6	
			7–43	Silty clay	CL, CH	A-7	
			43–60	Silty clay loam	ML-CL, CH	A-7	
Canfield: CdA, CdB, CdC, CdC2, CeB,[2] CfB, CfC[2]	1–2	>5	0–8	Silt loam	ML	A-4	
			8–20	Silt loam and loam	ML, CL	A-4 or A-6	
			20–44	Loam	ML, ML-CL	A-4	
			44–79	Loam	ML, CL, SC, SM	A-4 or A-6	1–5
Carlisle: Cg	0	>6	0–55	Muck	Pt		
Chagrin:[3] Ch, Ck, Cm	>3	>6	0–7	Silt loam	ML, ML-CL	A-4	
			7–28	Loam	SM, ML, CL	A-4	
			28–60	Channery sandy loam	SW-SM or SM	A-1 or A-2	1–10
*Chili: CnA, CnB, CnC, CoC2, CoD2, CpA, CpB, CpC, CuB, CuC, CwC2, CwD2, CwE2. For Wooster part of CwC2, CwD2, and CwE2, see Wooster series.	>4	>6	0–9	Loam	ML, SM	A-4	
			9–42	Gravelly sandy loam	SM	A-2 or A-4	1–10
			42–60	Gravelly sand	SW-SM, SM	A-1, A-2	1–10
*Conotton: CyD, CyE, CyF. For Oshtemo part of CyD, CyE, and CyF, see Oshtemo series.	>4	>6	0–13	Gravelly sandy loam	SM	A-2, A-4	1–5
			13–32	Very gravelly sandy loam.	GM, GW, SW, SM	A-1, A-2	5–10
			32–60	Gravelly sand	GW, GM, SW, SM	A-1	5–10
Damascus: Da	0–½	>6	0–7	Loam	ML, ML-CL	A-4	
			7–35	Sandy loam and sandy clay loam.	SM, ML	A-2, A-4	1–5
			35–60	Sand	SM	A-1 or A-2	1–5
Dekalb: DkC, DkD, DkE, DkF.	>3	1½–3½	0–5	Sandy loam	SM	A-2, A-4	1–10
			5–23	Channery sandy loam	SM	A-2	5–15
			23–36	Flaggy loamy sand and sand in fractures.	GP, GM	A-1	15–50
			36	Sandstone bedrock.			
Ellsworth: ElB, ElC, ElC2, ElE2, ElF2, EsB, EsC,[2] EuB, EuC.	1½–2½	>6	0–8	Silt loam	ML, ML-CL	A-4	
			8–31	Silty clay loam	CL	A-6 or A-7	
			31–60	Clay loam	CL, ML-CL	A-6	
Fitchville: FcA, FcB, Fn	½–1½	>6	0–10	Silt loam	ML, ML-CL	A-4	
			10–29	Silt clay loam	ML-CL, CL	A-6 or A-4	
			29–60	Silt loam	ML-CL, CL	A-6 or A-4	

See footnotes at end of table.

properties significant to engineering

such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for Made land (Ma; Md), Rough broken land (Rv; Rw), Shale rock land (Sc), Urban land (Ur), and the Urban land parts of the complexes

Percentage passing sieve—				Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Steel (uncoated)	Concrete
				Inches per hour	*Inches per inch of soil*	*pH*			
75–95	55–75	50–60	30–55	2. 0–6. 3	0. 12–0. 15	5. 1–5. 5	Low	------------	Moderate.
40–60	35–65	20–40	10–30	2. 0–6. 3	0. 07–0. 10	5. 1–5. 5	Low	Low	Moderate.
90–100	80–100	70–90	55–70	0. 63–6. 3	0. 15–0. 18	5. 6–6. 0	Low	------------	Moderate.
80–100	70–100	45–75	25–55	2. 0–6. 3	0. 12–0. 15	4. 6–5. 0	Low	Moderate	High.
75–90	60–80	40–60	10–35	6. 3–12. 0	0. 07–0. 10	5. 1–6. 0	Low	Moderate	Moderate.
100	95–100	90–100	80–95	0. 2–0. 63	0. 17–0. 20	4. 1–5. 0	Moderate	------------	Moderate.
100	95–100	90–100	90–100	<0. 06	0. 13–0. 15	5. 1–7. 3	High	High	Moderate to low.
100	95–100	90–100	90–100	<0. 06	0. 13–0. 15	[1] 7. 4–8. 4	High	High	Low.
100	95–100	90–100	70–95	0. 2–0. 63	0. 17–0. 20	4. 1–5. 5	Low	------------	Moderate to high.
100	95–100	90–100	90–100	<0. 06	0. 13–0. 15	5. 1–7. 3	High	High	Moderate to low.
100	95–100	90–100	90–100	<0. 06	0. 13–0. 15	[1] 7. 4–8. 4	High	High	Low.
90–100	80–100	70–95	60–90	0. 63–2. 0	0. 18–0. 22	4. 6–5. 5	Low	------------	Moderate to high.
90–100	75–95	70–90	60–90	0. 63–2. 0	0. 16–0. 19	4. 6–5. 5	Low	Moderate	Moderate to high.
90–100	75–95	70–95	50–80	0. 06–0. 2	0. 07–0. 10	4. 6–5. 5	Low	Moderate	Moderate to high.
80–100	75–100	70–90	40–85	0. 06–0. 2	0. 10–0. 14	6. 1–7. 3	Low	Moderate	Low.
--------	----------	----------	------------	2. 0–6. 3	0. 2–0. 24	5. 6–6. 5	Variable	High	Moderate.
90–100	80–100	75–95	65–90	0. 63–2. 0	0. 17–0. 20	5. 6–7. 8	Low	------------	Low.
80–95	60–80	55–75	45–70	0. 63–2. 0	0. 14–0. 17	5. 6–7. 8	Low	Low	Low.
70–85	45–60	35–55	5–20	2. 0–6. 3	0. 05–0. 10	5. 6–7. 8	Low	Low	Low.
90–100	70–90	50–75	40–70	2. 0–6. 3	0. 14–0. 18	4. 6–5. 0	Low	------------	Moderate.
70–90	45–75	30–60	25–45	2. 0–6. 3	0. 08–0. 12	4. 6–5. 0	Low	Low	Moderate.
70–90	45–75	25–45	5–25	6. 3–12. 0	0. 02–0. 04	5. 6–6. 5	Low	Low	Moderate.
70–90	55–75	45–65	25–50	6. 3–12. 0	0. 12–0. 14	5. 1–5. 5	Low	------------	Moderate.
50–75	35–60	20–40	5–15	6. 3–12. 0	0. 06–0. 10	5. 1–5. 5	Low	Low	Moderate.
40–75	25–60	15–50	0–25	>12. 0	0. 02–0. 04	5. 6–6. 0	Low	Low	Moderate.
90–100	80–100	80–95	50–85	2. 0–6. 3	0. 14–0. 17	5. 1–5. 5	Low	------------	Moderate.
90–100	75–95	55–85	25–60	2. 0–6. 3	0. 10–0. 14	5. 1–5. 5	Low	High	Moderate.
90–100	60–75	40–70	15–30	6. 3–12. 0	0. 04–0. 06	5. 6–6. 0	Low	High	Moderate.
85–95	75–95	60–80	30–40	6. 3–12. 0	0. 08–0. 14	4. 6–5. 0	Low	------------	High.
60–90	50–75	40–60	15–30	6. 3–12. 0	0. 08–0. 10	4. 6–5. 0	Low	Low	High.
30–40	20–30	5–20	1–15	6. 3–12. 0	0. 02–0. 04	4. 6–5. 0	Low	Low	High.
100	90–100	85–95	75–90	0. 63–2. 0	0. 18–0. 22	5. 1–6. 0	Low	------------	Moderate.
100	85–100	80–95	75–95	0. 06–0. 20	0. 14–0. 18	4. 6–6. 5	Moderate	High	Moderate to high
95–100	85–100	80–95	70–90	0. 06–0. 20	0. 14–0. 18	[1] 7. 4–8. 4	Moderate	High	Low.
100	100	90–100	85–100	0. 63–2. 0	0. 17–0. 20	5. 1–6. 0	Low	------------	Moderate.
100	100	95–100	85–100	0. 2–0. 63	0. 17–0. 20	4. 6–5. 5	Low to moderate.	High	Moderate to high.
100	90–100	90–100	60–95	0. 2–0. 63	0. 17–0. 20	6. 6–7. 3	Low	High	Low.

See footnotes at end of table.

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to seasonally high water table	Depth to bedrock	Depth from surface	Classification			Coarse fraction greater than 3 inches
				USDA texture	Unified	AASHO	
	Feet	*Feet*	*Inches*				*Percent*
Frenchtown: Fr	0	>6	0-10	Silt loam	ML, ML-CL	A-4	
			10-32	Clay loam	CL, ML-CL	A-6 or A-7	
			32-62	Loam and clay loam	SM, ML	A-4	
			62-86	Loam	ML, ML-CL	A-4	1-5
Geeburg: GbB, GbC2, GbD2.	1½-2½	>6	0-7	Silt loam	ML, ML-CL	A-4 or A-6	
			7-33	Silty clay	CH, CL	A-7	
			33-60	Silty clay	CH, CL	A-7	
Glenford: GfA, GfB, GfC2, GfD2, GoB, GoC.	1½-2½	>6	0-12	Silt loam	ML, ML-CL	A-4	
			12-40	Silt loam	CL, ML	A-6 or A-7	
			40-80	Silt loam	ML, CL	A-4 or A-6	
*Haskins: HcB	½-1	>6	0-10	Loam	ML-CL, ML	A-4	
For Caneadea part of HcB, see Caneadea series.			10-25	Sandy loam	SC, CL	A-4 or A-6	1-5
			25-60	Silty clay	CL	A-6 or A-7	
Holly:[3] Ho, Hy	0-½	>6	0-9	Silt loam	ML, ML-CL	A-4	
			9-35	Silt loam, and sandy loam.	ML, ML-CL	A-4	
			35-60	Sandy loam and gravelly sand.	ML, SM	A-4 or A-2	
Jimtown: JtA, JtB, Ju	½-1½	>6	0-11	Loam	ML-CL, ML	A-4	
			11-41	Loam and sandy loam	SM, ML	A-4	1-5
			41-60	Gravelly sand	SM, SW-SM	A-1 or A-2	1-5
Linwood: Ld	0	>6	0-24	Muck	Pt		
			24-60	Loam	ML, SM	A-4	
Lobdell:[3] Le	1½-2½	>6	0-23	Silt loam	ML, ML-CL	A-4	
			23-60	Silt loam and sandy loam	ML, SM	A-4 or A-2	
Lorain: Ln	0	>6	0-8	Silty clay loam	MH	A-7	
			8-41	Silty clay	CH	A-7	
			41-60	Silty clay loam	CL, ML-CL	A-6 or A-7	
Loudonville: LoB, LoC, LoC2, LoD, LoE, LuC.	>3	1½-3½	0-12	Silt loam	ML, ML-CL	A-4	1-5
			12-29	Clay loam	CL, ML-CL	A-4	1-5
			29-35	Channery clay loam	CL, SC	A-4	5-25
			35-40	Sandstone bedrock.			
Luray: Ly	0	>6	0-11	Silt loam	ML, CL	A-6	
			11-40	Silty clay loam	CL, CH	A-6 or A-7	
			40-60	Silt loam	CL, ML-CL	A-6 or A-4	
Mahoning: MgA, MgB, MlB,[3] Mn.	½-1½	>6	0-11	Silt loam	ML, ML-CL	A-4 or A-6	
			11-32	Silty clay loam	CL, ML-CL	A-6 or A-7	
			32-73	Silty clay loam	CL	A-6	
Mitiwanga: MtB	½-1½	1½-3½	0-8	Silt loam	ML, ML-CL	A-4	1-5
			8-38	Silt loam	ML, CL	A-4 or A-6	5-15
			38-50	Sandstone bedrock.			

See footnotes at end of table.

significant to engineering—Continued

Percentage passing sieve—				Permea-bility	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Steel (uncoated)	Concrete
				Inches per hour	*Inches per inch of soil*	*pH*			
95–100	90–100	85–100	75–85	0.2–0.63	0.17–0.20	6.1–7.3	Low		Moderate to high.
90–100	85–100	80–100	80–95	0.2–0.63	0.15–0.17	4.6–5.0	Low	High	High.
80–100	75–90	55–75	45–70	0.06–0.2	0.08–0.12	4.6–5.0	Low	High	High.
85–95	80–90	75–85	55–75	0.2–0.63	0.08–0.10	5.6–7.3	Low	High	Moderate to high.
100	100	85–100	80–95	0.2–0.63	0.17–0.21	5.6–6.0	Low to moderate.		Moderate.
100	100	95–100	90–100	0.06–0.20	0.13–0.15	5.6–6.0	High	High	Moderate.
100	100	90–100	90–100	0.06–0.20	0.13–0.15	[1] 7.4–8.4	High	High	Low.
100	100	90–100	80–95	0.63–2.0	0.17–0.20	5.1–6.6	Low		Moderate.
100	100	95–100	80–100	0.2–0.63	0.17–0.20	4.6–5.5	Low to moderate.	Moderate	Moderate to high.
100	90–100	90–100	60–100	0.2–0.63	0.17–0.20	[1] 6.6–7.4	Low	Moderate	Low.
95–100	90–100	85–95	50–75	0.63–2.0	0.14–0.18	5.6–6.0	Low		Moderate.
90–100	90–100	80–95	45–65	0.63–2.0	0.10–0.14	5.6–6.0	Low	High	Moderate.
95–100	85–95	80–90	70–80	0.06–0.20	0.08–0.12	[1] 6.6–7.8	High	High	Low.
95–100	90–100	80–90	70–90	0.63–2.0	0.19–0.23	5.6–7.8	Low		Moderate.
95–100	90–100	80–90	60–75	0.2–0.63	0.14–0.18	5.6–7.8	Low	High	Moderate.
95–100	85–100	40–80	15–75	0.63–2.0	0.08–0.15	7.4–7.8	Low	High	Low.
90–100	80–90	70–85	55–80	0.63–2.0	0.15–0.18	5.6–6.5	Low		Moderate.
80–95	75–90	65–85	40–65	2.0–6.3	0.12–0.15	5.1–5.5	Low	High	Moderate.
70–90	50–70	30–60	10–35	6.3–12.0	0.07–0.10	5.6–6.0	Low	High	Moderate.
				2.0–6.3	0.20–0.25	5.6–6.0	Variable	High	Moderate.
85–95	80–90	75–90	40–75	0.63–2.0	0.10–0.14	6.1–7.3	Low	High	Low.
95–100	85–100	75–95	65–90	0.63–2.0	0.17–0.20	5.6–6.5	Low	Moderate	Moderate.
90–100	85–95	50–75	30–60	0.63–6.3	0.15–0.19	5.6–6.5	Low	Moderate	Moderate.
100	100	90–100	85–100	0.2–0.63	0.18–0.22	6.1–6.5	Moderate		Low.
100	100	95–100	95–100	0.06–0.20	0.15–0.18	6.1–6.5	High	High	Low.
100	100	95–100	90–100	0.06–0.20	0.15–0.18	[1] 7.4–7.8	Moderate to high.	High	Low.
80–95	75–90	70–85	60–80	0.63–2.0	0.18–0.22	5.1–5.5	Low		Moderate to high.
80–95	70–85	60–80	55–75	0.63–2.0	0.16–0.18	5.1–5.5	Low	Low	Moderate to high.
70–90	55–75	45–65	35–55	0.63–2.0	0.10–0.15	5.1–5.5	Low	Low	Moderate to high.
100	100	90–100	85–100	0.63–2.0	0.20–0.23	5.6–6.5	Low		Moderateto low.
100	95–100	90–100	85–100	0.2–0.63	0.17–0.20	5.6–6.5	Moderate to high.	High	Moderate to low.
100	90–100	85–100	80–95	0.2–0.63	0.17–0.20	6.6–7.3	Low	High	Low.
100	100	90–100	75–90	0.63–2.0	0.18–0.22	5.1–6.5	Low		Moderate.
95–100	90–100	85–95	75–90	0.06–0.20	0.16–0.19	5.1–6.0	Moderate	High	Moderate.
95–100	85–100	80–95	70–90	0.06–0.20	0.08–0.12	[1] 7.4–7.8	Moderate	High	Low.
85–95	75–90	70–90	65–90	0.63–2.0	0.17–0.20	5.1–6.0	Low		Moderate.
80–95	75–90	70–90	60–85	0.63–2.0	0.17–0.20	5.1–6.5	Low	High	Moderate.

See footnotes at end of table.

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to seasonally high water table	Depth to bed-rock	Depth from surface	Classification: USDA texture	Classification: Unified	Classification: AASHO	Coarse fraction greater than 3 inches
	Feet	*Feet*	*Inches*				*Percent*
Olmsted: Od	0	>6	0–13	Loam	ML	A-4	
			13–34	Sandy loam	SM, ML	A-2, A-4	1–5
			34–80	Stratified sandy loam, loamy sand, and sandy clay loam.	SM	A-1 or A-2	1–5
Orrville:[3] Or	½–1½	>6	0–30	Silt loam	ML, ML-CL	A-4	
			30–60	Silt loam	ML, ML-CL	A-4	
Oshtemo: OsA, OsB, OsC	>4	>6	0–9	Sandy loam	SM	A-2, A-4	
			9–42	Sandy loam to loamy sand.	SM	A-2, A-4	
			42–75	Sand	SM, SP-SM	A-1, A-2	
Ravenna: ReA, ReB, Rn	½–1½	>6	0–7	Silt loam	ML, ML-CL	A-4	
			7–23	Silt loam and silty clay loam.	ML, CL	A-4 or A-6	
			23–51	Loam	ML, CL	A-4	
			51–90	Loam	ML, SM	A-4	1–5
Rittman: RsB, RsC, RsC2, RsD, RsD2, RsE2, RtB, RtC,[2] RuB, RuC.	1–2	>6	0–6	Silt loam	ML	A-4	
			6–20	Silt loam and clay loam	ML, CL	A-6	
			20–46	Clay loam	ML, CL	A-4	
			46–66	Silty clay loam	ML, CL	A-4, A-6	
Sebring: Sb	0–½	>6	0–14	Silt loam	ML, ML-CL	A-4	
			14–50	Silty clay loam	ML-CL, CL	A-6 or A-7	
			50–60	Loam and silt loam	ML-CL, CL	A-6, A-4	
Sloan:[3] So	0	>6	0–16	Silt loam	ML, CL	A-4 or A-6	
			16–40	Silt loam	ML, CL	A-4 or A-6	
			40–60	Sandy loam	SM, ML	A-4	
Tioga:[3] Tg	>3	>6	0–8	Loam	ML	A-4	
			8–48	Loamy sand, loam and silt loam.	SM, ML	A-2 or A-4	
			48–60	Very gravelly loamy sand.	SM	A-2 or A-4	
Trumbull: Tr	0	>6	0–15	Silt loam	ML, ML-CL	A-4 or A-6	
			15–50	Silty clay loam	ML-CL, CH	A-6 or A-7	
			50–60	Clay loam	CL	A-6	
Wadsworth: WaA, WaB, Wb.	½–1½	>6	0–14	Silt loam	ML, ML-CL	A-4	
			14–23	Clay loam	ML, ML-CL	A-6	
			23–44	Silty clay loam	CL	A-6	
			44–80	Silty clay loam	CL, ML-CL	A-6 or A-4	
Wallkill:[4] Wc	0	>6	0–15	Silt loam	ML	A-4 or A-6	
			15–25	Silty clay loam	CL, ML-CL	A-6	
			25–60	Muck	Pt		
Wheeling: WrA, WrB	>4	>6	0–10	Silt loam	ML, ML-CL	A-4	
			10–35	Silt loam	ML, CL	A-4 or A-6	
			35–60	Sandy loam and sand	SM, SP-SM	A-2 or A-1	1–5
Willette: Wt	0	>6	0–24	Muck	Pt		
			24–60	Silty clay	CL, CH	A-7 or A-6	
Wooster: WuB, WuC, WuC2, WuD, WuD2, WuE2, WuF2, WvC2, WvD2,[2] WwD.	>3	>6	0–15	Silt loam	ML, ML-CL	A-4	
			15–30	Loam	ML, CL	A-4	1–5
			30–54	Loam	SM, ML, CL	A-4	1–5
			54–70	Loam	SM, ML, CL	A-4	1–5

[1] Calcareous.
[2] Sandstone at a depth of 3½ to 5 feet.

significant to engineering—Continued

Percentage passing sieve—				Permea-bility	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Steel (uncoated)	Concrete
				Inches per hour	*Inches per inch of soil*	*pH*			
95–100	85–100	75–90	60–85	0.63–2.0	0.14–0.18	4.6–5.5	Low	—	High.
95–100	85–100	55–85	25–60	0.63–6.3	0.10–0.14	4.6–5.5	Low	High	High.
95–100	65–90	45–70	15–35	6.3–12.0	0.05–0.09	5.6–6.0	Low	High	Moderate.
95–100	90–100	85–100	65–90	0.63–2.0	0.17–0.22	5.1–6.5	Low	High	Moderate.
95–100	90–100	80–100	60–90	0.63–2.0	0.16–0.20	6.1–6.5	Low	High	Low.
90–100	80–95	45–70	25–45	2.0–6.3	0.10–0.14	5.6–6.5	Low	—	Moderate.
95–100	90–100	55–85	25–45	2.0–6.3	0.10–0.14	5.1–6.0	Low	Low	Moderate.
95–100	90–100	40–60	5–25	6.3–12.0	0.02–0.04	6.1–6.5	Low	Low	Low.
95–100	90–100	80–90	70–85	0.63–2.0	0.17–0.20	5.6–7.3	Low	—	Moderte.
90–100	85–100	80–100	70–95	0.63–2.0	0.16–0.19	4.6–5.5	Low to moderate.	High	High. a
85–100	85–100	80–100	50–70	0.06–0.20	0.08–0.12	4.6–5.5	Low	High	High.
85–95	75–90	70–80	45–65	0.2–0.63	0.14–0.18	5.6–6.5	Low	High	Moderate.
95–100	90–100	90–100	70–90	0.63–2.0	0.18–0.22	4.6–5.5	Low	—	High.
90–100	85–95	70–90	60–80	0.63–2.0	0.16–0.19	4.6–5.5	Moderate	Moderate	High.
80–100	80–100	75–100	60–90	0.06–0.20	0.07–0.10	5.1–6.5	Low	Moderate	Moderate.
85–100	75–100	80–95	55–80	0.06–0.20	0.07–0.10	[1] 7.4–7.8	Low	Moderate	Low.
100	100	90–100	85–100	0.63–2.0	0.17–0.21	5.1–6.0	Low	—	Moderate.
100	100	95–100	85–100	0.2–0.63	0.17–0.20	4.6–5.5	Low to moderate.	High	Moderate to high.
100	90–100	90–100	60–95	0.2–0.63	0.17–0.20	5.6–6.5	Low	High	Moderate to low.
100	100	85–100	70–90	0.63–2.0	0.20–0.23	5.6–6.5	Low	—	Moderate to low.
100	100	85–100	70–90	0.2–0.63	0.17–0.20	5.6–6.5	Low	High	Moderate to low.
95–100	90–100	60–90	40–70	0.2–2.0	0.15–0.19	6.6–7.3	Low	High	Low.
95–100	85–100	80–95	70–90	0.63–2.0	0.16–0.20	6.6–7.3	Low	—	Low.
90–100	85–95	45–75	25–65	0.63–2.0	0.12–0.18	6.6–7.3	Low	Low	Low.
80–100	45–75	35–50	25–40	2.0–6.3	0.08–0.12	6.6–7.3	Low	Low	Low.
100	90–100	90–100	85–90	0.20–0.63	0.18–0.22	4.6–5.5	Low	—	Moderate to high.
100	90–100	90–100	80–95	<0.06	0.10–0.16	4.6–6.5	Moderate to high.	High	Moderate to high.
100	90–100	80–100	70–90	<0.06	0.08–0.12	[1] 7.4–7.8	Moderate	High	Low.
95–100	90–100	90–100	75–90	0.63–2.0	0.17–0.20	5.1–5.5	Low	—	Moderate.
95–100	90–100	85–90	70–80	0.63–2.0	0.17–0.20	4.6–5.5	Moderate	High	Moderate to high.
85–100	80–100	75–95	60–85	0.06–0.20	0.07–0.10	5.1–6.5	Low	High	Moderate.
90–100	80–100	75–95	60–85	0.06–0.20	0.07–0.10	[1] 7.4–7.8	Low	High	Low.
100	100	90–100	80–95	0.63–2.0	0.19–0.22	5.6–6.0	Low	—	Moderate to low.
100	100	90–100	85–100	0.20–0.63	0.16–0.19	5.6–6.0	Moderate	High	Moderate.
—	—	—	—	2.0–6.3	0.20–0.25	4.6–5.5	Variable	High	High.
100	90–100	80–100	70–100	0.63–2.0	0.17–0.21	5.1–6.0	Low	—	Moderate.
100	90–100	80–100	75–100	0.63–2.0	0.17–0.21	4.6–5.5	Low	Low	Moderate to high.
80–100	50–80	35–75	10–35	6.3–12.0	0.04–0.10	4.6–5.5	Low	Low	Moderate to high.
—	—	—	—	2.0–6.3	0.20–0.25	5.6–6.0	Variable	High	Moderate.
100	95–100	90–100	80–95	0.06–0.20	0.07–0.10	6.1–7.3	High	High	Low.
90–100	90–100	85–95	60–85	0.63–2.0	0.17–0.22	5.1–6.0	Low	—	Moderate.
90–100	80–95	70–90	55–75	0.63–2.0	0.15–0.18	4.6–5.5	Low	Low	Moderate to high.
85–95	85–90	75–85	45–70	0.63–2.0	0.07–0.10	5.1–6.0	Low	Low	Moderate.
85–100	80–90	75–90	40–60	0.63–2.0	0.07–0.10	5.6–6.5	Low	Low	Moderate.

[3] Hazard of flooding.
[4] Subject to ponding.

TABLE 6.—*Engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils tions for referring to other series that appear in the first column of this table. Borrow pits (Bp), Clay pits and quarries (Cx), Gravel land are not rated in this table]

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Suitability as source of— Sand and gravel	Suitability as source of— Road fill	Soil features affecting— Highway location	Soil features affecting— Pipeline construction and maintenance
Berks: BeF	Poor: very steep slopes; siltstone at a depth of 20 to 40 inches.	Low	Poor: channery surface layer.	Not suitable	Good to fair to a depth of 20 to 40 inches; siltstone bedrock below this depth.	Siltstone bedrock at a depth of 20 to 40 inches.	Siltstone bedrock at a depth of 20 to 40 inches; very steep slopes.
*Bogart: BgA, BgB, BhB. For Haskins part of BhB, see Haskins series.	Fair to good: loamy material; seasonally wet; coarse material in substratum.	Low	Good	Good below a depth of 3 feet.	Fair to good in upper 3 feet; loamy material. Good below a depth of 3 feet coarse material.	Good stability; moderately well drained.	Trench walls are unstable; seasonally high water table.
Canadice: Ca.	Poor: wet and sticky in winter; clayey material.	Moderate to high.	Fair: limited suitable material; sticky when wet; low organic-matter content.	Not suitable	Poor: sticky when wet; medium to high compressibility; fair to poor compaction and stability.	Seasonal high water table; poorly drained; compressible when wet; nearly level.	Poorly drained; seasonally high water table; sticky when wet; nearly level.
Caneadea: CcA, CcB.	Poor: wet and sticky in winter; clayey material.	Moderate to high.	Fair: limited suitable material; sticky when wet; low organic-matter content.	Not suitable	Poor: sticky when wet; medium to high compressibility; fair to poor compaction and stability.	High water table during winter and spring; somewhat poorly drained; compressible when wet.	Somewhat poorly drained; seasonally high water table; sticky when wet.
Canfield: CdA, CdB, CdC, CdC2, CeB, CfB, CfC.	Fair to poor: loamy material; seasonally wet.	Moderate	Good	Not suitable: sandstone bedrock at a depth of 40 to 60 inches in CeB.	Fair: fair stability and compaction; medium compressibility.	Moderately well drained; seasonally high water table; sandstone bedrock at a depth of 40 to 60 inches in CeB.	Moderately well drained; fragipan in subsoil is hard and dense when dry; seasonally high water table; sandstone bedrock at a depth of 40 to 60 inches in CeB.
Carlisle: Cg	Poor: organic soil material.	High	Poor if used alone; fair to good if mixed with mineral soil.	Not suitable: organic soil.	Not suitable: organic soil; unstable.	Organic soil; high water table; very poorly drained; soft and unstable.	Organic soil; soft and unstable; high water table; very poorly drained.

interpretations

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instruc-
pits (Gp), Made land (Ma, Md), Shale rock land (Sc), Urban land (Ur), and the Urban land parts of the complexes that contain Urban

Soil features affecting—Continued					
Pond reservoir areas	Low dikes, levees, and other embankments	Agricultural drainage	Irrigation	Terraces and diversions	Waterways
High seepage rate; 20 to 40 inches to siltstone bedrock; very steep slopes.	Fair stability; fair to good compaction; very steep slopes; limited material.	Not needed; well drained; very steep slopes.	Low available moisture capacity; bedrock at a depth of 20 to 40 inches; very steep slopes.	Siltstone at a depth of 20 to 40 inches; very steep slopes; droughty and erodible.	Siltstone at a depth of 20 to 40 inches; very steep slopes; droughty and erodible.
Excessive seepage in substratum.	Fair to good stability and compaction; moderate to high permeability; poor resistance to piping.	Moderately well drained; seasonally high water table; moderately rapid permeability.	Medium to low available moisture capacity; rapid intake rate.	Short slopes; slow runoff.	Short slopes; slow runoff; channels are droughty.
Seasonally high water table; very low seepage rate; nearly level.	Fair to poor compaction and stability; medium to high compressibility; good resistance to piping.	Very slow permeability; seasonally high water table; poorly drained.	Poorly drained; very slow permeability.	Nearly level; poorly drained.	Poorly drained; nearly level.
Seasonally high water table; low seepage rate.	Very slow permeability; fair to poor compaction and stability; medium to high compressibility; good resistance to piping.	Very slow permeability; seasonally high water table; somewhat poorly drained.	Somewhat poorly drained; very slow permeability.	Somewhat poorly drained; slopes are generally short; sticky when wet.	Somewhat poorly drained; sticky when wet.
Low seepage rate; seasonally high water table; sandstone bedrock at a depth of 40 to 60 inches in CeB.	Fair stability and compaction; moderate to low seepage rate; slight piping hazard; medium compressibility.	Moderately well drained; fragipan; slow permeability; seasonally high water table.	Medium available moisture capacity; slow permeability.	Seepage in channels in some places; moderately well drained.	Seepage in channels in some places; moderately well drained.
High water table; organic material; excessive seepage in the muck.	Unstable organic material; high seepage rate.	High water table; organic soil; unstable; subsides when drained.	Organic soil; very high available moisture capacity; very poorly drained; subject to soil blowing.	Nearly level; very poorly drained; high water table.	Nearly level; very poorly drained; high water table.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Sand and gravel	Road fill	Soil features affecting— Highway location	Pipeline construction and maintenance
Chagrin: Ch, Ck, Cm.	Fair: subject to flooding.	Moderate to low.	Good to a depth of 24 inches.	Fair to good for sand below a depth of 3 to 4 feet; generally poor for gravel.	Fair: fair stability and compaction in upper 24 inches. Good below 24 inches.	Subject to flooding; nearly level; well drained.	Subject to flooding; trench walls subject to caving; nearly level.
*Chili: CnA, CnB, CnC, CoC2, CoD2, CpA, CpB, CpC, CuB, CuC, CwC2, CwD2, CwE2. For Wooster part of CwC2, CwD2, and CwE2, see Wooster series.	Good: well-drained.	Low	Fair for non-gravelly soils; poor for CoC2, CoD2; gravelly surface layer.	Good below a depth of 3 feet.	Fair to good in upper 3 feet: loamy and gravelly material. Good below a depth of 3 feet: coarse material.	Good stability; well drained; cut slopes are droughty; some steep slopes.	Trench walls are unstable; well drained; trench floors are stable.
*Conotton: CyD, CyE, CyF. For Oshtemo part of CyD, CyE, and CyF, see Oshtemo series.	Good: well-drained; gravelly.	Low	Poor: gravelly surface layer.	Good below a depth of 2 feet.	Good: well-drained; gravelly.	Some steep slopes; droughty; well drained; good stability.	Trench walls unstable; some steep slopes; well drained; trench floors are stable.
Damascus: Da.	Poor: poorly drained; seasonally wet.	High	Fair to good	Good below a depth of 36 inches.	Fair to good in upper 3 feet; good below a depth of 3 feet.	Seasonally high water table; poorly drained; nearly level.	Poorly drained; trench walls are unstable; seasonally high water table.
Dekalb: DkC, DkD, DkE, DkF.	Good: well drained.	Low	Poor: contains coarse fragments.	Not suitable: sandstone bedrock at a depth of 1½ to 3½ feet.	Fair to good to a depth of 1½ to 3½ feet.	Sandstone bedrock at a depth of 1½ to 3½ feet; well drained; some very steep slopes.	Sandstone bedrock at a depth of 1½ to 3½ feet; some very steep slopes.

interpretations—Continued

Soil features affecting—Continued					
Pond reservoir areas	Low dikes, levees, and other embankments	Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Subject to flooding; excessive seepage rate; nearly level.	Fair stability and compaction; moderate permeability; low piping resistance.	Not needed; well drained.	High available moisture capacity; subject to flooding.	Subject to flooding; nearly level and well drained.	Subject to flooding; nearly level; well drained.
High seepage rate; pervious, sandy, gravelly material in substratum.	Good stability; high seepage rate; subject to piping.	Not needed; well drained.	Medium to low available moisture capacity; rapid water-intake rate.	Well drained; generally short slopes; droughty.	Well drained; generally short slopes; droughty.
High seepage rate; pervious, sandy, gravelly material.	Good stability; high seepage rate; subject to piping.	Not needed; well drained.	Very low available moisture capacity; rapid water-intake rate; well drained.	Coarse sand and gravel; droughty; erodible; difficult to vegetate.	Coarse sand and gravel; droughty; erodible; difficult to vegetate.
High seepage rate; seasonally high water table; nearly level.	Good stability; high seepage rate; subject to piping.	Moderately rapid permeability; seasonally high water table; poorly drained.	Medium to low available moisture capacity; rapid water-intake rate; poorly drained; nearly level.	Nearly level; poorly drained.	Poorly drained; nearly level.
High seepage rate; sandstone bedrock at a depth of 1½ to 3½ feet; some very steep slopes.	Limited material; moderate permeability; fair stability.	Not needed; well drained.	Low to very low available moisture capacity; sandstone bedrock at a depth of 1½ to 3½ feet.	Sandstone bedrock at a depth of 1½ to 3½ feet; well drained and droughty.	Sandstone bedrock at a depth of 1½ to 3½ feet; well drained; droughty.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Sand and gravel	Road fill	Soil features affecting— Highway location	Pipeline construction and maintenance
Ellsworth: ElB, ElC, ElC2, ElE2, ElF2, EsB, EsC, EuB, EuC:	Poor: moderately well drained; seasonally wet and sticky.	Moderate	Fair: limited suitable material; the moderately eroded soils are poor.	Not suitable: sandstone bedrock at a depth of 40 to 60 inches in EsB and EsC.	Poor: medium to high compressibility.	Seasonally high water table; some steep slopes; slow permeability; medium to high compressibility; moderately well drained; sandstone bedrock at a depth of 40 to 60 inches in EsB and EsC.	Moderately well drained; seasonally high water table; sandstone bedrock at a depth of 40 to 60 inches in EsB and EsC.
Fitchville: FcA, FcB, Fn.	Poor: somewhat poorly drained; seasonally wet.	High	Good to a depth of 10 inches; fair to a depth of 24 inches; moderately fine textured.	Not suitable	Poor: medium to high compressibility.	High water table during winter and spring; soft and compressible when wet; cut slopes are erodible; somewhat poorly drained.	Somewhat poorly drained; trench wells are unstable; seasonally wet.
Frenchtown: Fr.	Poor: poorly drained; seasonally wet.	High	Good to a depth of 12 inches; fair to a depth of 24 inches; moderately fine textured.	Not suitable	Poor: fair to poor stability.	Seasonally high water table; nearly level; fragipan in subsoil; poorly drained.	Poorly drained; fragipan in subsoil; seasonally wet; nearly level.
Geeburg: GbB, GbC2, GbD2.	Poor: clayey material; wet and sticky in winter.	Moderate	Fair: thin clayey material.	Not suitable	Poor: medium to high compressibility; fair to poor stability and compaction.	Seasonally high water table; plastic clay difficult to work; moderately well drained; medium to high compressibility.	Clayey; seasonally wet and sticky; moderately well drained.
Glenford: GfA, GfB, GfC2, GfD2, GoB, GoC.	Poor: seasonally wet.	High	Good to a depth of 24 inches.	Not suitable	Poor: fair to poor stability and compaction; medium to high compressibility.	Seasonally wet; soft and compressible; cut slopes are erodible.	Seasonally wet; trench walls are subject to caving.
*Haskins: HcB. For Caneadea part of HcB, see Caneadea series.	Poor: seasonally wet.	Moderate to high.	Good	Not suitable	Fair in upper 20 to 40 inches: fair stability and compaction. Poor in substratum: medium to high compressibility.	Seasonally high water table; somewhat poorly drained; substratum is clayey and difficult to work.	Somewhat poorly drained; upper trench walls unstable; seasonally high water table.

interpretations—Continued

Soil features affecting—Continued					
Pond reservoir areas	Low dikes, levees, and other embankments	Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Slow seepage rate; some steep slopes; seasonally high water table; sandstone bedrock at a depth of 40 to 60 inches in EsB and EsC:	Fair to good stability and compaction; slow permeability; low seepage rate; medium to high compressibility.	Moderately well drained; seasonally high water table; slow permeability.	Medium available moisture capacity; slow permeability.	Slow permeability; channels are difficult to vegetate; some steep slopes.	Slow permeability; channels are difficult to vegetate and are seepy in places.
Seasonally high water table; slow seepage rate.	Fair stability and compaction; slow permeability; medium to high compressibility; erodible on slopes; subject to piping.	Moderately slow permeability; seasonally high water table; somewhat poorly drained.	Medium to high available moisture capacity; moderately slow permeability; somewhat poorly drained.	Somewhat poorly drained; erodible; seasonally wet.	Somewhat poorly drained; short slopes erodible; seasonally wet.
Seasonally high water table; slow seepage; poorly drained; nearly level.	Fair to poor stability and compaction; slow permeability; subject to piping; slight to medium compressibility.	Slow permeability; seasonally high water table; poorly drained.	Medium available moisture capacity; slow permeability; poorly drained.	Nearly level; poorly drained; seasonally wet.	Poorly drained; seasonally wet; nearly level.
Slow seepage rate; clayey.	Fair to poor stability and compaction; slow permeability; medium to high compressibility; high resistance to piping.	Moderately well drained; slow permeability; seasonally wet.	Medium available moisture capacity; slow water-intake rate.	Slow permeability; clayey material difficult to work and vegetate; seasonally wet; moderately well drained.	Clayey material difficult to work; high runoff; seasonally wet; moderately well drained.
Subject to moderate seepage in substratum.	Fair to poor stability and compaction; slow permeability; fair piping resistance.	Moderately well drained; moderately slow permeability.	High available moisture capacity; medium water-intake rate; moderately well drained.	Moderately well drained; subject to seepage; erodible.	Seasonally wet and seepy; channels are erodible.
Moderate seepage in upper 20 to 40 inches; clayey substratum has slow seepage rate.	Fair to good stability and compaction; slow permeability; good resistance to piping.	Seasonally high water table; slow permeability below a depth of 20 to 40 inches; somewhat poorly drained.	Medium available moisture capacity; medium water-intake rate; somewhat poorly drained.	Somewhat poorly drained; slopes are generally short; subject to seepage.	Somewhat poorly drained; erodible; subject to seepage.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Soil features affecting—	
			Topsoil	Sand and gravel	Road fill	Highway location	Pipeline construction and maintenance
Holly: Ho, Hy.	Poor: poorly drained; subject to flooding; seasonally high water table.	High	Good	Not suitable	Fair: medium compressibility; fair to poor stability.	Subject to flooding; seasonally high water table; nearly level.	Subject to flooding; seasonally high water table; trench walls subject to caving.
Jimtown: JtA, JtB, Ju.	Poor: seasonally wet.	High	Good	Fair to good in upper 3 feet; good below a depth of 3 feet.	Fair: fair stability and compaction; medium to slight compressibility.	Seasonally high water table; somewhat poorly drained.	Somewhat poorly drained; trench walls unstable; seasonally high water table.
Linwood: Ld.	Poor: high water table; organic; very poorly drained.	High	Poor if used alone; good if mixed with mineral soil.	Not suitable	Not suited in upper 2 to 3½ feet: organic. Fair in subtratum: loamy material.	Upper 2 to 3½ feet is organic and highly unstable; very poorly drained.	Very poorly drained and wet most of year; upper 2 to 3½ feet is very unstable organic material.
Lobdell: Le	Fair to poor: seasonally wet; moderately well drained.	High	Good to a depth of 2 feet.	Not suitable	Fair: fair to poor stability and compaction.	Subject to flooding; nearly level.	Subject to flooding; trench walls are unstable.
Lorain: Ln	Poor: wet and sticky in winter.	High	Fair: limited suitable material; high organic-matter content.	Not suitable	Poor: clayey subsoil; soft and compressible.	Seasonally high water table; plastic clayey material in subsoil; nearly level.	Very poorly drained; clayey subsoil; seasonally high water table.
Loudonville: LoB, LoC, LoC2, LoD, LoE, LuC.	Fair to poor: well drained; generally wet and sticky in winter.	Low	Fair to good: limited suitable material.	Not suitable: sandstone bedrock at a depth of 20 to 40 inches.	Fair: loamy material; medium compressibility; sandstone bedrock at a depth of 20 to 40 inches.	Well drained; sandstone bedrock at a depth of 20 to 40 inches; some steep slopes.	Sandstone bedrock at a depth of 20 to 40 inches; well drained; some steep slopes.
Luray: Ly	Poor: very poorly drained; seasonally high water table.	High	Good	Not suitable	Poor: medium to high compressibility.	High water table most of year; soft and unstable when wet; very poorly drained.	Very poorly drained; trench walls are unstable; high water table for long periods.
Mahoning: MgA, MgB, MIB, Mn.	Poor	High	Fair to good: limited suitable material.	Not suitable: sandstone bedrock at a depth of 40 to 60 inches in MIB.	Poor: medium to high compressibility.	Seasonally high water table; somewhat poorly drained; sandstone bedrock at a depth of 40 to 60 inches in MIB.	Somewhat poorly drained; seasonally high water table; sandstone bedrock at a depth of 40 to 60 inches in MIB.

interpretations—Continued

Soil features affecting—Continued					
Pond reservoir areas	Low dikes, levees, and other embankments	Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Subject to flooding; seasonally high water table; subject to excessive seepage in substratum.	Fair to poor stability and compaction; slow permeability; fair resistance to piping.	Moderately slow permeability; subject to flooding; outlets difficult to obtain in some places; poorly drained.	High available moisture capacity; medium water-intake rate; poorly drained; subject to flooding.	Nearly level; subject to flooding; seasonally wet.	Nearly level; subject to flooding; seasonally wet.
Excessive seepage; seasonally high water table.	Fair stability and compaction; moderate permeability; poor resistance to piping.	Seasonally high water table; somewhat poorly drained.	Medium to low available moisture capacity; rapid water-intake rate; somewhat poorly drained.	Somewhat poorly drained; sesaonally wet.	Somewhat poorly drained; seasonally wet.
High water table; high seepage rate; high organic-matter content.	Upper 2 to 3½ feet of organic material is unstable; excessive seepage in loamy substratum.	High water table most of year; unstable muck; subject to subsidence if drained.	High available moisture capacity; rapid water-intake rate; very poorly drained.	Very poorly drained muck; nearly level.	Very poorly drained muck; nearly level.
Subject to flooding; moderate seepage rate.	Fair to poor stability and compaction; moderate permeability; susceptible to piping.	Moderately well drained, moderate permeability; subject to flooding.	High available moisture capacity; medium water-intake rate; subject to flooding.	Nearly level; subject to flooding.	Nearly level; subject to flooding.
Seasonally high water table; slow seepage rate.	Slow permeability; fair to poor compaction and stability; high compressibility; good resistance to piping.	Seasonally high water table; slow permeability; outlets difficult to obtain in some places; very poorly drained.	Medium available moisture capacity; medium to slow water-intake rate; very poorly drained.	Nearly level; very poorly drained; seasonally high water table.	Nearly level; very poorly drained; seasonally high water table.
Sandstone bedrock at a depth of 20 to 40 inches.	Fair stability and compaction; medium compressibility; subject to seepage in underlying rock.	Not needed; well drained.	Moderately deep to sandstone bedrock; medium to low available moisture capacity; medium water-intake rate.	Moderately deep to sandstone bedrock; some slopes are more than 12 percent; well drained.	Sandstone bedrock at a depth of 20 to 40 inches; well drained; cut channels are droughty.
Seasonally high water table; slow seepage; nearly level.	Fair to poor stability and compaction; slow permeability; fair resistance to piping; erodible on slopes.	Moderately slow permeability; high water table; very poorly drained; outlets lacking in some places.	High available moisture capacity; medium water-intake rate; very poorly drained; nearly level.	Nearly level; very poorly drained.	Nearly level; very poorly drained.
Seasonally high water table; slow seepage rate; sandstone bedrock at a depth of 40 to 60 inches in MIB.	Fair to good stability and compaction; slow seepage; medium to high compressibility; good resistance to piping.	Slow permeability; seasonally high water table; somewhat poorly drained.	Medium available moisture capacity; slow water-intake rate; somewhat poorly drained.	Somewhat poorly drained; subject to seepage in wet periods; seasonally wet for long periods.	Cut channels are seepy in spring and droughty in summer; difficult to vegetate; somewhat poorly drained.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Sand and gravel	Road fill	Soil features affecting— Highway location	Pipeline construction and maintenance
Mitiwanga: MtB.	Poor: somewhat poorly drained; generally wet in winter.	High	Good to a depth of 18 inches.	Not suitable: sandstone bedrock at a depth of 20 to 40 inches.	Fair to poor: fair to poor stability and compaction; medium compressibility; sandstone bedrock at a depth of 20 to 40 inches.	Seasonally high water table; sandstone bedrock at a depth of 20 to 40 inches; somewhat poorly drained.	Sandstone bedrock at a depth of 20 to 40 inches; seasonally high water table; somewhat poorly drained.
Olmsted: Od.	Poor: very poorly drained; seasonally high water table.	High	Good	Fair at a depth below 3 feet; high content of fines in some places.	Fair in upper 36 inches: fair to poor stability. Good below a depth of 36 inches: coarse material.	High water table for long periods; very poorly drained; nearly level.	Very poorly drained; trench walls are unstable; high water table for long periods.
Orrville: Or	Poor: somewhat poorly drained; subject to flooding.	High	Good to a depth of 2 feet or more.	Not suitable	Fair: poor stability and compaction.	Subject to flooding; high water table during winter and spring; nearly level.	Subject to flooding; trench walls are unstable; seasonally high water table; nearly level.
Oshtemo: OsA, OsB, OsC.	Good	Low	Good to a depth of 15 inches.	Good for sand below a depth of 3 feet; poor for gravel.	Fair to good: fair to good stability; sandy material below a depth of 30 inches.	Well drained; cut slopes are unstable and droughty.	Trench walls are unstable; well drained; sandy below a depth of 30 inches.
Ravenna: ReA, ReB, Rn.	Poor: somewhat poorly drained; seasonally high water table.	High	Good	Not suitable	Fair to good: fair to good stability and compaction.	High water table during winter and spring; seepage above fragipan; somewhat poorly drained.	Somewhat poorly drained; fragipan in subsoil; seasonally saturated.
Rittman: RsB, RsC, RsC2, RsD, RsD2, RsE2, RtB, RtC, RuB, RuC.	Fair to poor: loamy material; seasonally wet; moderately well drained.	Moderate	Good, except where eroded.	Not suitable: sandstone bedrock at a depth of 40 to 60 inches in RtB and RtC.	Fair: fair stability and compaction; medium compressibility.	Some steep slopes; sandstone bedrock at a depth of 40 to 60 inches in RtB and RtC; seasonally high water table; moderately well drained; seepage above fragipan.	Gently sloping to steep; moderately well drained; sandstone bedrock at a depth of 40 to 60 inches in RtB and RtC; seasonally wet.

interpretations—Continued

Soil features affecting—Continued					
Pond reservoir areas	Low dikes, levees, and other embankments	Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Sandstone bedrock at a depth of 20 to 40 inches; subject to high seepage rate.	Fair to poor stability and compaction; moderate to slow permeability; limited suitable material.	Sandstone bedrock at a depth of 20 to 40 inches; moderate permeability; somewhat poorly drained.	Sandstone bedrock at a depth of 20 to 40 inches; medium to low available moisture capacity; medium water-intake rate; somewhat poorly drained.	Sandstone bedrock at a depth of 20 to 40 inches; somewhat poorly drained.	Somewhat poorly drained; erodible; cut channels are droughty in summer; sandstone bedrock at a depth of 20 to 40 inches.
High water table; excessive seepage rate.	Fair to poor stability; fair compaction; moderate permeability; poor resistance to piping; pervious substratum.	Moderate to moderately rapid permeability below a depth of 12 inches; high water table; very poorly drained; nearly level.	Medium to low available moisture capacity; rapid water-intake rate; very poorly drained; nearly level.	Nearly level; very poorly drained.	Very poorly drained; nearly level.
Subject to flooding; moderate seepage rate; occasional sandy seams.	Poor stability and compaction; moderate permeability; poor resistance to piping; medium compressibility.	Moderate permeability; seasonally high water table; subject to flooding; outlets may be difficult to obtain in some places.	High available moisture capacity; medium water-intake rate; subject to flooding; somewhat poorly drained.	Nearly level; subject to flooding; seasonally wet.	Nearly level; subject to flooding; seasonally wet.
Pervious sandy material; excessive seepage.	Fair to good stability and compaction; moderate seepage rate; subject to piping.	Not needed: well drained.	Low available moisture capacity; moderately rapid water-intake rate.	Well drained; channels are droughty and erodible.	Well drained; channels are droughty and erodible.
Seasonally high water table; slow seepage rate.	Fair to good stability and compaction; slow permeability; fair resistance to piping.	Slow permeability; seasonally high water table; fragipan in subsoil; somewhat poorly drained.	Medium available moisture capacity; medium to slow water-intake rate; somewhat poorly drained.	Somewhat poorly drained; seepage above fragipan.	Somewhat poorly drained; seepage above fragipan; cut channels likely to be droughty.
Slow seepage rate; moderately well drained; sandstone bedrock at a depth of 40 to 60 inches in RtB and RtC; seasonally wet.	Fair to good stability and compaction; slow seepage rate; medium compressibility.	Moderately well drained; slow permeability; fragipan in subsoil.	Medium available moisture capacity; medium to slow water-intake rate; moderately well drained.	Fragipan causes some seepiness; gently sloping to steep; seasonally wet.	Fragipan causes some seepiness; erodible material; moderately well drained.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Soil features affecting—	
			Topsoil	Sand and gravel	Road fill	Highway location	Pipeline construction and maintenance
Rough broken land: Rv	Poor: very steep slopes; seasonally wet.	High	Poor: very steep slopes.	Not suitable	Poor: high compressibility; fair to poor stability.	Very steep slopes; unstable material; subject to slippage.	Very steep slopes; trench wall unstable.
Rw	Poor: very steep slopes.	High	Poor: very steep slopes.	Generally not suitable; some small areas good for sand or gravel.	Poor: highly variable material; very steep slopes.	Very steep slopes; unstable material; subject to slippage in some places.	Very steep slopes; trench walls unstable.
Sebring: Sb	Poor: poorly drained; seasonally wet.	High	Good: low organic-matter content.	Not suitable	Poor: medium to high compressibility; fair to poor stability and compaction.	High water table for long periods; soft and compressible when wet; poorly drained; nearly level.	Poorly drained; trench walls unstable; nearly level; seasonally high water table.
Sloan: So	Poor: seasonally wet; very poorly drained; subject to flooding.	High	Good to a depth of 24 inches.	Not suitable	Poor: fair to poor stability and compaction; medium compressibility.	Subject to flooding; high water table for long periods; nearly level; soft and compressible when wet.	Subject to flooding; seasonally wet; trench walls unstable.
Tioga: Tg	Good: subject to flooding.	Low	Good	Some places fair for sand below a depth of 3 to 4 feet; generally poor for gravel.	Fair to good: fair to poor stability.	Subject to flooding; nearly level; well drained.	Subject to flooding; well drained.
Trumbull: Tr.	Poor: poorly drained; seasonally wet and sticky.	High	Fair: limited suitable material; low organic-matter content.	Not suitable	Poor: medium to high compressibility; fair to poor stability and compaction.	Seasonally high water table; poorly drained; medium to high compressibility; nearly level.	Poorly drained; seasonally high water table.
Wadsworth: WaA, WaB, Wb.	Poor: somewhat poorly drained; seasonally high water table.	High	Good	Not suitable	Fair to poor: medium compressibility.	High water table during winter and spring; seepage above fragipan; somewhat poorly drained.	Somewhat poorly drained; fragipan in subsoil; seasonally saturated.
Wallkill: Wc	Poor: poorly drained.	High	Good to a depth of 15 inches.	Not suitable	Poor: upper 20 to 40 inches has medium to high compressibility; underlying muck is unsuitable.	Subject to flooding or ponding; soft and unstable; highly unstable underlying muck; poorly drained; nearly level.	Subject to flooding or ponding; underlying material is organic and very unstable; poorly drained.

interpretations—Continued

Soil features affecting—Continued					
Pond reservoir areas	Low dikes, levees, and other embankments	Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Extremely variable material; may have slow to fast seepage rate; very steep slopes.	Fair to poor stability and compaction; very steep slopes.	Very steep slopes; subject to slippage; mostly wooded.	Very steep slopes; mostly wooded.	Very steep slopes; mostly wooded.	Very steep slopes; mostly wooded.
Extremely variable material; very steep slopes.	Extremely variable material; very steep slopes.	Very steep slopes----	Very steep slopes----	Very steep slopes----	Very steep slopes; variable material.
Seasonally high water table; moderately slow seepage rate; poorly drained; nearly level.	Fair to poor stability and compaction; slow permeability; medium to high compressibility; fair to poor resistance to piping.	Moderately slow permeability; seasonally high water table; ditch walls tend to collapse; poorly drained.	High available moisture capacity; medium water-intake rate; poorly drained.	Poorly drained; nearly level.	Poorly drained; nearly level; seasonally saturated.
Subject to flooding; subject to excessive seepage; nearly level.	Fair to poor stability and compaction; slow permeability; subject to piping; medium compressibility.	Moderately slow permeability; high water table; subject to flooding; outlets difficult to obtain in some places.	Subject to flooding; very poorly drained.	Nearly level; subject to flooding; very poorly drained; seasonally wet.	Nearly level; subject to flooding; very poorly drained; seasonally wet.
Pervious material; excessive seepage; subject to flooding.	Fair to poor stability and compaction; moderate permeability; poor resistance for piping.	Not needed; well drained.	Medium to low available moisture capacity; subject to flooding; nearly level.	Nearly level; subject to flooding.	Nearly level; subject to flooding.
Seasonally high water table; very slow seepage rate; nearly level.	Very slow permeability; fair to poor stability and compaction; medium to high compressibility.	Very slow permeability; poorly drained; nearly level; seasonally high water table.	Medium available moisture capacity; slow water-intake rate; poorly drained; nearly level.	Poorly drained; nearly level; seasonally wet.	Poorly drained; nearly level; seasonally wet.
Slow seepage rate; seasonally high water table; somewhat poorly drained.	Fair to good stability and compaction; slow permeability; good to fair resistance to piping; medium compressibility.	Slow permeability; seasonally high water table; somewhat poorly drained; fragipan in subsoil.	Medium available moisture capacity; medium to slow water-intake rate; somewhat poorly drained.	Somewhat poorly drained; seepage above fragipan; seasonally wet.	Somewhat poorly drained; seepage above fragipan; seasonally wet.
Organic material at a depth of 20 to 40 inches; poorly drained; subject to flooding.	Upper 20 to 40 inches has medium to high compressibility; underlying muck is not suited.	High water table; subject to flooding or ponding; underlying organic material is very unstable.	High available moisture capacity; medium water-intake rate; poorly drained; subject to flooding.	Nearly level; poorly drained; subject to flooding or ponding.	Nearly level; poorly drained; subject to flooding or ponding.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Soil features affecting—	
			Topsoil	Sand and gravel	Road fill	Highway location	Pipeline construction and maintenance
Wheeling: WrA, WrB.	Good	Low	Good to a depth of 3 feet.	Good below a depth of 3½ feet.	Fair in upper 3½ feet; fair stability and compaction; good below a depth of 3½ feet; coarse material.	Well drained; moderate permeability.	Trench walls unstable; sand and gravel below a depth of 3½ feet.
Willette: Wt.	Poor: very poorly drained; organic material.	High	Poor if used alone; good if mixed with mineral soil.	Not suitable	Organic soil; not suitable for road fill.	Very poorly drained; unstable organic soil; high water table for long periods; subject to ponding.	Very poorly drained; unstable organic material.
Wooster: WuB, WuC, WuC2, WuD, WuD2, WuE2, WuF2, WvC2, WvD2, WwD.	Good: well drained but saturated for short periods in winter.	Moderate to low.	Generally good to a depth of 18 inches, but fair to poor in eroded soils.	Not suitable: sandstone bedrock at a depth of 40 to 60 inches in WvC2 and WvD2.	Fair: medium compressibility.	Well drained; some very steep slopes; sandstone bedrock at a depth of 40 to 60 inches in WvC2 and WvD2.	Well drained; some very steep slopes; sandstone bedrock at a depth of 40 to 60 inches in WvC2 and WvD2; some steep slopes.

roots. Thus, some of the water stored is not available to plant roots.

In the column showing reaction, ranges in pH represent a summary of the many field tests made during the survey on each of the soils in the county. Liming and other management practices can result in a pH that differs from that indicated in this column. Reaction is defined in the Glossary at the back of this soil survey.

The estimated shrink-swell potential is an indication of the volume change to be expected in the soil material as moisture content changes. A soil material rated high has serious limitations for use as building foundations, backfill, highway locations, and other engineering uses.

The ratings of corrosion potential given for uncoated steel are based on soil texture, drainage, and total acidity. Electrical resistivity is not considered in this rating. The corrosion potential for concrete is based on soil texture and pH value. The ratings given are for average concrete. The ratings do not apply to concrete mixed specifically for corrosion resistance.

Engineering interpretations of soils

Table 6 describes and rates selected characteristics of the soils that affect soil use for engineering purposes. The interpretations in the table are based on the actual and estimated soil test data in tables 4 and 5 and on field experience. Explanations of the column headings in table 6 are given in the following paragraphs.

Suitability for winter grading.—Because of wetness, plasticity, or susceptibility to frost action, many of the soils are not adapted to winter grading. Such soils are rated as poor.

Susceptibility to frost action.—Silty and fine sandy soils that are wet most of the winter and that have a readily available source of water are the ones that are most susceptible to frost action. These and others that show evidence of frost action are rated high.

Suitability as source of topsoil.—The thickness, texture, and natural fertility of the surface layer of a soil determine its suitability for use as a topdressing for roadbanks and embankments to promote the growth of vegetation. Only the surface layer of the soil is considered in this rating, except as noted otherwise.

Suitability as source of sand and gravel.—This column gives information about the soils as a possible source of sand and gravel for construction purposes. A rating of good does not mean that all areas of the soil are suitable for commercial development as a source of sand or gravel; however, a soil rated good has better possibilities as a source of sand or gravel than soils rated poor or fair. Sand and gravel for construction purposes is common beneath Chili, Conotton, Oshtemo, and Wheeling soils.

Suitability as a source of road fill.—Well-graded, coarse material or a mixture of clay and coarse-grained material is suitable as a source of road fill. Highly plastic clayey soils, poorly graded silty soils, and organic soils are difficult to compact and are not suited or are poorly suited as road fill.

Highway location.—Soil features that affect highway location include shallow depth to rock, a high water

interpretations—Continued

Soil features affecting—Continued					
Pond reservoir areas	Low dikes, levees, and other embankments	Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Excessive seepage rate in substratum.	Fair stability and compaction; moderate to high seepage rate; subject to piping.	Not needed; well drained.	Medium to high available moisture capacity; moderate water-intake rate; moderate permeability.	Well drained; erodible.	Well drained; erodible.
High water table; organic material; slow seepage.	Upper 1½ to 3½ feet is organic material; not suitable for embankments.	High water table most of year; organic material is unstable and subject to subsidence if drained.	High available moisture capacity; rapid water-intake rate; very poorly drained; nearly level.	Very poorly drained; subject to ponding; nearly level.	Very poorly drained; subject to ponding; nearly level.
Slow seepage rate; some very steep slopes; sandstone bedrock at a depth of 40 to 60 inches in WvC2 and WvD2.	Fair to good stability and compaction; moderate seepage rate; low piping hazard; medium compressibility.	Not needed; well drained.	Medium available moisture capacity; moderate water-intake rate; moderate permeability.	Well drained; erodible; some very steep slopes.	Well drained; some very steep slopes.

table, steep slopes, and susceptibility to slippage and flooding. Susceptibility to frost action is a hazard to highways but is rated separately in this table.

Pipeline construction and maintenance.—Soil features that affect pipelines are depth to hard bedrock, soil stability, high water table, and natural drainage. Corrosion potential is rated separately in table 5.

Pond reservoir areas.—Under this heading, consideration is given primarily to the sealing potential of the reservoir. Shallowness to bedrock and the susceptibility to overflow in flood plains are also noted.

Low dikes, levees, and other embankments.—Under this heading, the soils are rated according to their stability and permeability when used in the construction of pond embankments. The permeability noted in this column is for the soil material when it is compacted at optimum moisture. The ratings are also pertinent for low dikes and levees.

Agricultural drainage.—The soil features that affect agricultural drainage include natural drainage, the presence of a high seasonal water table, permeability, and depth to bedrock.

Irrigation.—The relative ease with which water normally infiltrates into, percolates through, and drains the soils is important for irrigation. Available moisture capacity of the soils and slope are also pertinent properties.

Terraces and diversions.—Slope and the relative erodibility of the soil material are the main features that affect terraces and diversions. Other features include depth to rock and the presence of a seasonal high water table. Nearly level soils need no terracing, steep soils are not well suited to terracing, and highly erodible soils require special care in the construction of diversions.

Waterways.—Slope and erodibility of the soil are the main considerations that affect the establishment of waterways. Depth to rock and water table are noted where the data is significant.

Town and Country Planning

Summit County is a part of the rapidly expanding industrial and residential part of northeastern Ohio. Housing developments, highways, factories, and shopping centers are competing for acreage with farming and other land uses, and farming in the county is declining. It is no longer a major land use.

The expansion of town and country uses of the soils removes many acres from farm use in a short period. Freeways and super highways displace as much as 50 acres per mile, and a shopping center sometimes displaces 50 to 100 acres. Such uses permanently remove land from farm use.

This section of the soil survey gives information about properties of the soils that affect selected nonfarm use of soils. The information will help community planners and industrial users of land who generally look for areas that are least costly to develop and maintain. Development and maintenance costs are related to soil limitations. These planners will find other useful information on the detailed soil map and in other parts of this

survey. Table 7 gives the estimated degree and kinds of limitations of soils for some selected land uses. From this information, alternative uses can be developed as a basis for long-range planning and zoning. Because extensive manipulation of the soil alters some of its natural properties, the ratings for some uses do not apply to areas that have undergone extensive cutting and filling.

The estimated degree of limitations of the soils for a specified land use is indicated as *slight*, *moderate*, or *severe*. A rating of *slight* indicates that the soil has no important limitation to the specified use. *Moderate* shows that the soil has some limitations to the specified use. These limitations need to be recognized, but they can be overcome or corrected. A rating of *severe* indicates that the soil has serious limitations that are costly and difficult to overcome.

Following are explanations of the uses rated in table 7.

Cultivated crops.—The soils are rated according to their limitations to use for cultivated crops only. The degree of limitation is based on slope and the erosion hazard or on the ease or difficulty of obtaining artificial drainage. This land use is rated in this table in a comparative manner to aid land use planners when they consider whether or not farming is a sound land use.

Onsite sewage effluent disposal.—Most of the acreage in the county has limitations for disposing of effluent from septic tanks. Excessive slope, a seasonally high water table, restricted permeability, poor natural drainage, flooding, and limited depth to bedrock are some

TABLE 7.—*Estimated degree and kinds o*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in referring to other series that appear in the first column of this table. Borrow pits (Bp), Clay pits and quarries (Cx), Gravel pits (Gp), not rated in this table]

Soil series and map symbols	Cultivated crops	Onsite sewage effluent disposal	Sites for homes of 3 stories or less [1]	Lawns, landscaping, and golf fairways	Streets and parking lots [2]
Berks: BeF	Severe: slope and erosion.	Severe: slope; 20 to 40 inches deep to shale and sandstone.	Severe: slope; 20 to 40 inches deep to shale and sandstone.	Severe: slope; 20 to 40 inches deep to shale and sandstone.	Severe: slope; 20 to 40 inches deep to shale and sandstone.
*Bogart:					
BgA	Slight	Moderate: seasonally high water table.[3]	Moderate: seasonally high water table.	Slight	Moderate: seasonally high water table.
BgB, BhB. For Haskins part of BhB, see Haskins series.	Slight	Moderate: seasonally high water table.[3]	Moderate: seasonally high water table.	Slight	Moderate: seasonally high water table; slope.
Canadice: Ca	Severe: poorly drained.	Severe: very slow permeability; seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table.
Caneadea:					
CcA	Moderate: somewhat poorly drained.	Severe: very slow permeability; seasonally high water table.	Severe: seasonally high water table.	Moderate: seasonally high water table.	Moderate: seasonally high water table.
CcB	Moderate: somewhat poorly drained.	Severe: very slow permeability; seasonally high water table.	Severe: seasonally high water table.	Moderate: seasonally high water table.	Moderate: seasonally high water table; slope.
Canfield:					
CdA	Slight	Severe: slow permeability.	Moderate: seasonally high water table.	Slight	Moderate: seasonally high water table.
CdB, CeB, CfB	Slight: CfB not rated for farming.	Severe: slow permeability.	Moderate: seasonally high water table.	Slight	Moderate: seasonally high water table; slope.
CdC, CdC2, CfC.	Moderate: slope and erosion; CfC not rated for farming.	Severe: slow permeability.	Moderate: seasonally high water table; slope.	Moderate: slope	Severe: slope

See footnotes at end of table.

of these limitations. In some soils in the county, a dense fragipan in the subsoil causes a severe limitation for sewage effluent disposal. Disposal fields in the Canfield soils, however, are more satisfactory for a longer period than those in the similar Rittman soils. Both soils rate *severe* on the basis of slow permeability.

In the Chili, Oshtemo, and some other soils in the county, effluent is inadequately filtered because of a coarse-textured substratum. In places it contaminates the ground water, nearby springs, lakes, or streams. If filter fields for septic tanks are established in soils that have slopes of more than 12 percent, seepage downslope is a concern or the soil may be unstable when saturated. Before a septic tank system is installed, an investigation should be made at the proposed site to determine suitable ways to overcome soil limitations. Improperly functioning filter fields are a major source of pollution to water supplies and are a hazard to health.

Homesite location.—Major soil features that limit use of soils as homesites are limited depth to bedrock, flooding, poor natural drainage, and excessive slope. The ratings are for houses of three stories or less that have a basement, but the ratings also apply to sites for small industrial, commercial, and institutional buildings. Limitations affecting onsite sewage disposal are rated separately in this table.

Flooding is a severe hazard where it occurs. Homes constructed on soils that are naturally wet likely will have wet basements unless adequate drainage is provided. Some of the wet soils in the county are the Ma-

limitations of soils for specified land uses

such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for
Made land (Ma, Md), Shale rock land (Sc), Urban land (Ur), and the Urban land parts of the complexes that contain Urban land are

Athletic fields (intensive use)	Parks and play areas	Campsites		Sanitary landfills	Cemeteries
		Tents	Trailers		
Severe: slope; 20 to 40 inches deep to shale and sandstone.	Severe: slope	Severe: slope	Severe: slope	Severe: slope; 20 to 40 inches to shale and sandstone.	Severe: slope; 20 to 40 inches to shale and sandstone.
Moderate: seasonally high water table.	Slight	Moderate: seasonally high water table.	Moderate: seasonally high water table.	Severe: permeable in substratum.[3]	Moderate: seasonally high water table.
Moderate: seasonally high water table; slope.	Slight	Moderate: seasonally high water table.	Moderate: seasonally high water table; slope.	Severe: permeable in substratum.[3]	Moderate: seasonally high water table.
Severe: very slow permeability; seasonally high water table.	Severe: seasonally high water table.	Severe: very slow permeability; seasonally high water table.	Severe: very slow permeability; seasonally high water table.	Severe: seasonally high water table; clayey texture.	Severe: very slow permeability; seasonally high water table.
Severe: very slow permeability; seasonally high water table.	Moderate: seasonally high water table.	Severe: very slow permeability; seasonally high water table.	Severe: very slow permeability; seasonally high water table.	Severe: seasonally high water table; clayey texture.	Severe: seasonally high water table; clayey texture.
Severe: very slow permeability; seasonally high water table.	Moderate: seasonally high water table.	Severe: very slow permeability; seasonally high water table.	Severe: very slow permeability; seasonally high water table.	Severe: seasonally high water table; clayey texture.	Severe: seasonally high water table; clayey texture.
Moderate to severe: slow permeability.	Slight	Moderate to severe: slow permeability.	Moderate to severe: slow permeability.	Moderate: seasonally high water table.	Moderate to severe: slow permeability; seasonally high water table.
Moderate to severe: slow permeability; slope.	Slight	Moderate to severe: slow permeability.	Moderate to severe: slow permeability.	Moderate: seasonally high water table.[4]	Moderate to severe: slow permeability; seasonally high water table.[4]
Severe: slope; slow permeability.	Moderate: slope	Moderate to severe: slow permeability; slope.	Severe: slope; slow permeability.	Moderate: seasonally high water table; slope.	Moderate to severe: slow permeability; seasonally high water table; slope.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbols	Cultivated crops	Onsite sewage effluent disposal	Sites for homes of 3 stories or less [1]	Lawns, landscaping, and golf fairways	Streets and parking lots [2]
Carlisle: Cg	Moderate: high water table.	Severe: high water table.	Severe: unstable organic soil; high water table; soft and compressible.	Severe: unstable organic soil; high water table; soft and compressible.	Severe: unstable organic soil; high water table; soft and compressible.
Chargrin: Ch, Ck, Cm.	Slight: Cm not rated for farming.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
*Chili:					
CnA, CpA	Slight	Slight [3]	Slight	Slight	Slight
CnB, CpB, CuB.	Slight: CuB not rated for farming.	Slight [3]	Slight	Moderate: medium to low available moisture capacity.	Moderate: slope
CnC, CoC2, CpC, CuC, CwC2. For Wooster part of CwC2, see Wooster series.	Moderate: slope and erosion; CuC not rated for farming.	Moderate: slope [3]	Moderate: slope	Moderate: medium to low available moisture capacity; slope.	Severe: slope
CoD2, CwD2, CwE2. For Wooster part of CwD2 and CwE2, see Wooster series.	Severe: slope and erosion.	Severe: slope [3]	Severe: slope	Severe: slope	Severe: slope
*Conotton: CyD, CyE, CyF. For Oshtemo part of CyD, CyE, and CyF, see Oshtemo series.	Severe: slope and erosion.	Severe: slope [3]	Severe: slope	Severe: slope; very low available moisture capacity.	Severe: slope
Damascus: Da	Moderate: poorly drained.	Severe: seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table.
Dekalb:					
DkC	Moderate: slope and erosion.	Severe: sandstone bedrock at a depth of 20 to 40 inches.	Severe: sandstone bedrock at a depth of 20 to 40 inches.	Moderate to severe: slope; low to very low available moisture.	Severe: sandstone bedrock at a depth of 20 to 40 inches; slope.
DkD, DkE, DkF.	Severe: slope and erosion.	Severe: sandstone bedrock at a depth of 20 to 40 inches; slope.	Severe: sandstone bedrock at a depth of 20 to 40 inches; slope.	Severe: slope	Severe: sandstone bedrock at a depth of 20 to 40 inches; slope.
Ellsworth:					
ElB, EsB, EuB.	Moderate: slope and erosion; EuB not rated for farming.	Severe: slow permeability.	Moderate: seasonally high water table.	Slight	Moderate: slope
ElC, ElC2, EsC, EuC.	Severe: slope and erosion; EuC not rated for farming.	Severe: slow permeability.	Moderate: seasonally high water table; slope.	Moderate: slope	Severe: slope
ElE2, ElF2	Severe: slope and erosion.	Severe: slow permeability; slope.	Severe: slope	Severe: slope	Severe: slope

See footnotes at end of table.

of soils for specified land uses—Continued

Athletic fields (intensive use)	Parks and play areas	Campsites: Tents	Campsites: Trailers	Sanitary landfills	Cemeteries
Severe: unstable organic soil; high water table; soft and compressible.	Severe: unstable organic soil; high water table; soft and compressible.	Severe: unstable organic soil; high water table; soft and compressible.	Severe: unstable organic soil; high water table; soft and compressible.	Severe: unstable organic soil; high water table; soft and compressible.	Severe: unstable organic soil; high water table; soft and compressible.
Moderate: subject to flooding.[5]	Moderate: subject to flooding.[5]	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.[3]	Severe: subject to flooding.
Slight	Slight	Slight	Slight	Severe: pervious substratum.[3]	Slight.
Moderate: slope	Slight	Slight	Moderate: slope	Severe: pervious substratum.[3]	Slight.
Severe: slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: pervious substratum.[3]	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: pervious substratum; slope.[3]	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: pervious material; slope.[3]	Severe: slope.
Severe: seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table; pervious material.[3]	Severe: seasonally high water table.
Severe: sandstone bedrock at a depth of 20 to 40 inches; slope.	Moderate: slope	Moderate: slope	Severe: slope	Severe: sandstone bedrock at a depth of 20 to 40 inches.	Severe: sandstone bedrock at a depth of 20 to 40 inches.
Severe: sandstone bedrock at a depth of 20 to 40 inches; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: sandstone bedrock at a depth of 20 to 40 inches; slope.	Severe: sandstone bedrock at a depth of 20 to 40 inches; slope.
Severe: slow permeability.	Slight	Severe: slow permeability.	Severe: slow permeability.	Moderate: seasonally high water table; moderately fine texture.[4]	Severe: slow permeability.[4]
Severe: slow permeability; slope.	Moderate: slope	Severe: slow permeability.	Severe: slow permeability; slope.	Moderate: seasonally high water table; moderately fine texture; slope.[4]	Severe: slow permeability.[4]
Severe: slow permeability; slope.	Severe: slope	Severe: slow permeability; slope.	Severe: slow permeability; slope.	Severe: slope	Severe: slow permeability; slope.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbols	Cultivated crops	Onsite sewage effluent disposal	Sites for homes of 3 stories or less [1]	Lawns, landscaping, and golf fairways	Streets and parking lots [2]
Fitchville:					
FcA, Fn	Slight; Fn not rated for farming.	Severe: seasonally high water table; moderately slow permeability.	Severe: soft and compressible when wet; seasonally high water table.	Moderate: seasonally high water table.	Severe: seasonally high water table; soft and compressible when wet.
FcB	Slight	Severe: seasonally high water table; moderately slow permeability.	Severe: soft and compressible when wet; seasonally high water table.	Moderate: seasonally high water table.	Severe: seasonally high water table; soft and compressible when wet.
Frenchtown: Fr	Moderate: poorly drained.	Severe: seasonally high water table; slow permeability.	Severe: seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table.
Geeburg:					
GbB	Moderate: slope and erosion.	Severe: slow permeability.	Moderate: seasonally high water table.	Slight	Moderate: slope; seasonally high water table.
GbC2	Severe: slope and erosion.	Severe: slow permeability.	Moderate: seasonally high water table; slope.	Moderate: slope and erosion.	Severe: slope
GbD2	Severe: slope and erosion.	Severe: slow permeability; slope.	Severe: slope	Severe: slope	Severe: slope
Glenford:					
GfA	Slight	Severe: moderately slow permeability.	Moderate: seasonally high water table; soft when wet.	Slight	Moderate: seasonally high water table; soft when wet.
GfB, GoB	Slight: GoB not rated for farming.	Severe: moderately slow permeability.	Moderate: seasonally high water water table; soft when wet.	Slight	Moderate: seasonally high water table; soft when wet; slope.
GfC2, GoC	Moderate: slope and erosion; GoC not rated for farming.	Severe: moderately slow permeability.	Moderate: seasonally high water table; soft when wet; slope.	Moderate: slope	Severe: slope; soft when wet.
GfD2	Severe: slope and erosion.	Severe: moderately slow permeability; slope.	Severe: slope	Severe: slope	Severe: slope
*Haskins: HcB For the Caneadea part of HcB, see Caneadea series.	Slight	Severe: seasonally high water table; slow permeability.	Severe: seasonally high water table.	Moderate: seasonally high water table.	Moderate: seasonally high water table; slope.
Holly: Ho, Hy	Moderate: poorly drained.	Severe: subject to flooding; moderately slow permeability.	Severe: subject to flooding; seasonally high water table.	Severe: subject to flooding; seasonally high water table.	Severe: subject to flooding: seasonally high water table.
Jimtown:					
JtA	Slight	Severe: seasonally high water table.[3]	Severe: seasonally high water table.	Moderate: seasonally high water table.	Moderate: seasonally high water table.
JtB, Ju	Slight: Ju not rated for farming.	Severe: seasonally high water table.[3]	Severe: seasonally high water table.	Moderate: seasonally high water table.	Moderate: seasonally high water table; slope.
Linwood: Ld	Moderate: high water table.	Severe: high water table.	Severe: unstable organic soil; high water table.	Severe: unstable organic soil; high water table.	Severe: unstable organic soil; high water table.

See footnotes at end of table.

of soils for specified land uses—Continued

Athletic fields (intensive use)	Parks and play areas	Campsites: Tents	Campsites: Trailers	Sanitary landfills	Cemeteries
Severe: seasonally high water table.	Moderate: seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table; subject to ponding.	Severe: seasonally high water table.
Severe: seasonally high water table.	Moderate: seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table.	Moderate: seasonally high water table.	Severe: seasonally high water table.
Severe: seasonally high water table; slow permeability.	Severe: seasonally high water table; subject to ponding.	Severe: seasonally high water table; slow permeability; subject to ponding.	Severe: seasonally high water table; slow permeability; subject to ponding.	Severe: seasonally high water table; subject to ponding.	Severe: seasonally high water table; slow permeability.
Severe: slow permeability.	Slight	Severe: slow permeability.	Severe: slow permeability.	Severe: clayey texture.	Severe: slow permeability.
Severe: slow permeability; slope.	Moderate: slope	Severe: slow permeability.	Severe: slow permeability; slope.	Severe: clayey texture.	Severe: slow permeability.
Severe: slow permeability; slope.	Severe: slope	Severe: slow permeability; slope.	Severe: slow permeability; slope.	Severe: slope; clayey texture.	Severe: slow permeability; slope.
Moderate: seasonally high water table; moderately slow permeability.	Slight	Moderate: seasonally high water table; moderately slow permeability.	Moderate: seasonally high water table; moderately slow permeability.	Moderate: seasonally high water table.	Moderate: seasonally high water table; moderately slow permeability.
Moderate: seasonally high water table; moderately slow permeability; slope.	Slight	Moderate: seasonally high water table; moderately slow permeability.	Moderate: seasonally high water table; slope.	Moderate: seasonally high water table.	Moderate: seasonally high water table; moderately slow permeability.
Severe: slope	Moderate: slope	Moderate: seasonally high water table; moderately slow permeability; slope.	Severe: slope	Moderate: seasonally high water table; slope.	Moderate: seasonally high water table; moderately slow permeability; slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: seasonally high water table; slow permeability.	Moderate: seasonally high water table.	Severe: seasonally high water table; slow permeability.	Severe: seasonally high water table; slow permeability.	Severe: seasonally high water table.	Severe: seasonally high water table; slope.
Severe: subject to flooding; seasonally high water table.	Severe: subject to flooding; season ally high water table.	Severe: subject to flooding; seasonally high water table.	Severe: subject to flooding; seasonally high water table.	Severe: subject to flooding; seasonally high water table.	Severe: subject to flooding; seasonally high water table.
Severe: seasonally high water table.	Moderate: seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table.	Severe: pervious material; seasonally high water table.[3]	Severe: seasonally high water table.
Severe: seasonally high water table.	Moderate: seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table.	Severe: pervious material; seasonally high water table.[3]	Severe: seasonally high water table.
Severe: unstable organic soil; high water table.	Severe: unstable organic soil; high water table.	Severe: unstable organic soil; high water table.	Severe: unstable organic soil; high water table.	Severe: unstable organic soil; high water table.	Severe: unstable organic soil; high water table.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbols	Cultivated crops	Onsite sewage effluent disposal	Sites for homes of 3 stories or less [1]	Lawns, landscaping, and golf fairways	Streets and parking lots [2]
Lobdell: Le	Slight	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Lorain: Ln	Moderate: very poorly drained.	Severe: high water table; slow permeability.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Loudonville:					
LoB	Slight	Severe: sandstone bedrock at a depth of 20 to 40 inches.	Moderate to severe: sandstone bedrock at a depth of 20 to 40 inches.	Slight	Moderate to severe: slope; sandstone bedrock at a depth of 20 to 40 inches.
LoC, LoC2, LuC.	Moderate: slope and erosion; LuC not rated for farming.	Severe: sandstone bedrock at a depth of 20 to 40 inches.	Moderate to severe: sandstone bedrock at a depth of 20 to 40 inches.	Moderate: slope	Severe: slope
LoD, LoE	Severe: slope and erosion.	Severe: sandstone bedrock at a depth of 20 to 40 inches; slope.	Severe: sandstone bedrock at a depth of 20 to 40 inches; slope.	Severe: slope	Severe: slope
Luray: Ly	Slight	Severe: high water table; moderately slow permeability.	Severe: high water table; soft when wet.	Severe: high water table.	Severe: high water table; soft when wet.
Mahoning:					
MgA, Mn	Moderate: somewhat poorly drained; Mn not rated for farming.	Severe: seasonally high water table; slow permeability.	Severe: seasonally high water table.	Moderate: seasonally high water table.	Moderate: seasonally high water table.
MgB, MlB	Moderate: somewhat poorly drained.	Severe: seasonally high water table; slow permeability.	Severe: seasonally high water table.	Moderate: seasonally high water table.	Moderate: seasonally high water table; slope.
Mitiwanga: MtB	Moderate: somewhat poorly drained.	Severe: seasonally high water table; sandstone bedrock at a depth of 20 to 40 inches.	Severe: seasonally high water table; sandstone bedrock at a depth of 20 to 40 inches.	Moderate: seasonally high water table.	Moderate: slope; seasonally high water table; sandstone bedrock at a depth of 20 to 40 inches.
Olmsted: Od	Slight	Severe: high water table.[3]	Severe: high water table.	Severe: high water table.	Severe: high water table.
Orrville: Or	Slight	Severe: seasonally high water table; subject to flooding.	Severe: seasonally high water table; subject to flooding.	Severe: seasonally high water table; subject to flooding.	Severe: seasonally high water table; subject to flooding.
Oshtemo:					
OsA	Slight	Slight [3]	Slight	Moderate: droughty.	Slight
OsB	Slight	Slight [3]	Severe	Moderate: droughty.	Moderate: slope
OsC	Moderate: slope and erosion.	Moderate: slope [3]	Moderate: slope	Moderate: droughty; slope.	Severe: slope
Ravenna:					
ReA, Rn	Slight: Rn not rated for farming.	Severe: seasonally high water table; slow permeability.	Severe: seasonally high water table; slow permeability.	Moderate: seasonally high water table; slow permeability.	Moderate: seasonally high water table.
ReB	Slight	Severe: seasonally high water table; slow permeability.	Severe: seasonally high water table; slow permeability.	Moderate: seasonally high water table; slow permeability.	Moderate: seasonally high water table; slope.

See footnotes at end of table.

of soils for specified land uses—Continued

Athletic fields (intensive use)	Parks and play areas	Campsites		Sanitary landfills	Cemeteries
		Tents	Trailers		
Moderate: seasonally high water table; subject to flooding.[5]	Moderate: seasonally high water table; subject to flooding.[5]	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Severe: high water table; slow permeability.	Severe: high water table.	Severe: high water table; slow permeability.	Severe: high water table; slow permeability.	Severe: high water table.	Severe: high water table; slow permeability.
Moderate to severe: slope; sandstone bedrock at a depth of 20 to 40 inches.	Moderate: sandstone bedrock at a depth of 20 to 40 inches.	Slight	Moderate: slope	Severe: sandstone bedrock at a depth of 20 to 40 inches.	Severe: sandstone bedrock at a depth of 20 to 40 inches.
Severe: slope	Moderate: sandstone bedrock at a depth of 20 to 40 inches; slope.	Moderate: slope	Severe: slope	Severe: sandstone bedrock at a depth of 20 to 40 inches.	Severe: sandstone bedrock at a depth of 20 to 40 inches.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: sandstone bedrock at a depth of 20 to 40 inches; slope.	Severe: sandstone bedrock at a depth of 20 to 40 inches; slope.
Severe: high water table; soft when wet.	Severe: high water table; soft when wet.	Severe: high water table; soft when wet.	Severe: high water table; soft when wet.	Severe: high water table; soft when wet.	Severe: high water table; soft when wet.
Severe: slow permeability; seasonally high water table.	Moderate: seasonally high water table.	Severe: slow permeability; seasonally high water table.	Severe: slow permeability; seasonally high water table.	Moderate: seasonally high water table; moderately fine texture.	Severe: seasonally high water table; slow permeability.
Severe: slow permeability; seasonally high water table.	Moderate: seasonally high water table.	Severe: slow permeability; seasonally high water table.	Severe: slow permeability; seasonally high water table; slope.	Moderate: seasonally high water table; moderately fine texture.[4]	Severe: seasonally high water table; slow permeability.[4]
Severe: seasonally high water table; sandstone bedrock at a depth of 20 to 40 inches.	Moderate: seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table.	Severe: sandstone bedrock at a depth of 20 to 40 inches.	Severe: seasonally high water table; sandstone bedrock at a depth of 20 to 40 inches.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.[3]	Severe: high water table.
Severe: seasonally high water table; subject to flooding.	Moderate: seasonally high water table; subject to flooding.	Severe: seasonally high water table; subject to flooding.	Severe: seasonally high water table; subject to flooding.	Severe: subject to flooding; seasonally high water table.[3]	Severe: subject to flooding; seasonally high water table.
Slight	Slight	Slight	Slight	Severe: pervious material.[3]	Slight.
Moderate: slope	Slight	Slight	Moderate: slope	Severe: pervious material.[3]	Slight.
Severe: slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: pervious material.[3]	Moderate: slope.
Severe: seasonally high water table; slow permeability.	Moderate: seasonally high water table.	Severe: slow permeability; seasonally high water table.	Severe: slow permeability; seasonally high water table.	Severe: seasonally high water table; subject to ponding.	Severe: seasonally high water table; subject to ponding; slow permeability.
Severe: seasonally high water table; slow permeability; slope.	Moderate: seasonally high water table.	Severe: slow permeability; seasonally high water table.	Severe: slow permeability; seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table; slow permeability.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbols	Cultivated crops	Onsite sewage effluent disposal	Sites for homes of 3 stories or less [1]	Lawns, landscaping, and golf fairways	Streets and parking lots [2]
Rittman:					
RsB, RtB, RuB.	Slight: RuB not rated for farming.	Severe: slow permeability.	Moderate: seasonally high water table.	Slight	Moderate: seasonally high water table; slope.
RsC, RsC2, RtC, RuC.	Moderate: slope and erosion; RuC not rated for farming.	Severe: slow permeability.	Moderate: seasonally high water table; slope.	Moderate: slope	Severe: slope
RsD, RsD2, RsE2.	Severe: slope and erosion.	Severe: slow permeability; slope.	Severe: slope	Severe: slope	Severe: slope
Rough broken land: Rv, Rw.	Severe: slope and erosion.	Severe: slope	Severe: slope; subject to slippage.	Severe: slope; subject to slippage.	Severe: slope; subject to slippage.
Sebring: Sb	Moderate: poorly drained.	Severe: seasonally high water table; moderately slow permeability.	Severe: soft when wet; seasonally high water table.	Severe: soft when wet; seasonally high water table.	Severe: soft when wet; seasonally high water table.
Sloan: So	Moderate: very poorly drained.	Severe: subject to flooding; moderately slow permeability.	Severe: subject to flooding; seasonally high water table.	Severe: subject to flooding; seasonally high water table.	Severe: subject to flooding; seasonally high water table.
Tioga: Tg	Slight	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Trumbull: Tr	Severe: poorly drained.	Severe: very slow permeability; seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table.
Wadsworth:					
WaA, Wb	Moderate: somewhat poorly drained; Wb not rated for farming.	Severe: slow permeability; seasonally high water table.	Severe: seasonally high water table.	Moderate: seasonally high water table.	Moderate: seasonally high water table.
WaB	Moderate: somewhat poorly drained.	Severe: slow permeability; seasonally high water table.	Severe: seasonally high water table.	Moderate: seasonally high water table.	Moderate: seasonally high water table; slope.
Wallkill: Wc	Moderate: poorly drained.	Severe: subject to flooding or ponding; seasonally high water table; moderately slow permeability.	Severe: subject to flooding or ponding; seasonally high water table; unstable.	Severe: subject to flooding or ponding; seasonally high water table; unstable.	Severe: subject to flooding or ponding; seasonally high water table; unstable.
Wheeling:					
WrA	Slight	Slight [3]	Slight	Slight	Slight
WrB	Slight	Slight [3]	Slight	Slight	Moderate: slope
Willette: Wt	Moderate: high water table.	Severe: high water table.	Severe: unstable organic soil; high water table; soft and compressible.	Severe: unstable organic soil; high water table; soft and compressible.	Severe: unstable organic soil; high water table; soft and compressible.
Wooster:					
WuB	Slight	Moderate: moderate permeability.	Slight	Slight	Moderate: slope
WuC, WuC2, WvC2.	Moderate: slope and erosion.	Moderate: moderate permeability; slope.	Moderate: slope	Moderate: slope	Severe: slope
WuD, WuD2, WuE2, WuF2, WvD2, WwD.	Severe: slope and erosion; WwD not rated for farming.	Severe: slope	Severe: slope	Severe: slope	Severe: slope

[1] The rating given in this column also applies to light industrial, institutional, and commercial locations. Also see ratings for shrink-swell potential in table 5.

[2] The criteria for rating do not include frost potential. See table 6 for susceptibility to frost action.

of soils for specified land uses—Continued

Athletic fields (intensive use)	Parks and play areas	Campsites: Tents	Campsites: Trailers	Sanitary landfills	Cemeteries
Severe: slow permeability.	Slight.	Severe: slow permeability.	Severe: slow permeability.	Moderate: seasonally high water table; moderately fine texture.[4]	Severe: slow permeability.[4]
Severe: slow permeability; slope.	Moderate: slope.	Severe: slow permeability.	Severe: slow permeability; slope.	Moderate: seasonally high water table; moderately fine texture; slope.[4]	Severe: slow permeability.[4]
Severe: slope; slow permeability.	Severe: slope.	Severe: slow permeability; slope.	Severe: slow permeability; slope.	Severe: slope.	Severe: slope; slow permeability.
Severe: slope; subject to slippage.	Severe: slope; subject to slippage.	Severe: slope; subject to slippage.	Severe: slope; subject to slippage.	Severe: slope; subject to slippage.	Severe: slope; subject to slippage.
Severe: soft when wet; seasonally high water table.	Severe: soft when wet; seasonally high water table.	Severe: soft when wet; seasonally high water table.	Severe: soft when wet; seasonally high water table.	Severe: soft when wet; seasonally high water table.	Severe: soft when wet; seasonally high water table.
Severe: subject to flooding; seasonally high water table.	Severe: subject to flooding; seasonally high water table.	Severe: subject to flooding; seasonally high water table.	Severe: subject to flooding; seasonally high water table.	Severe: subject to flooding; seasonally high water table.	Severe: subject to flooding; seasonally high water table.
Moderate: subject to flooding.[5] Severe: seasonally high water table; very slow permeability.	Moderate: subject to flooding.[5] Severe: seasonally high water table.	Severe: subject to flooding. Severe: seasonally high water table; very slow permeability.	Severe: subject to flooding. Severe: seasonally high water table; very slow permeability.	Severe: subject to flooding.[3] Severe: seasonally high water table.	Severe: subject to flooding. Severe: seasonally high water table; very slow permeability.
Severe: seasonally high water table; slow permeability.	Moderate: seasonally high water table.	Severe: slow permeability; seasonally high water table.	Severe: seasonally high water table; slow permeability.	Severe: seasonally high water table.	Severe: seasonally high water table; slow permeability.
Severe: seasonally high water table; slow permeability.	Moderate: seasonally high water table.	Severe: seasonally high water table; slow permeability.	Severe: slow permeability; seasonally high water table.	Severe: seasonally high water table.	Severe: seasonally high water table; slow permeability.
Severe: subject to flooding or ponding; seasonally high water table; unstable.	Severe: subject to flooding or ponding; seasonally high water table; unstable.	Severe: subject to flooding or ponding; seasonally high water table; unstable.	Severe: subject to flooding or ponding; seasonally high water table; unstable.	Severe: subject to flooding or ponding; seasonally high water table; unstable.	Severe: subject to flooding or ponding; seasonally high water table; unstable.
Slight.	Slight.	Slight.	Slight.	Severe: pervious substratum.[3]	Slight.
Moderate: slope.	Slight.	Slight.	Moderate: slope.	Severe: pervious substratum.[3]	Slight.
Severe: unstable organic soil; high water table; soft and compressible.	Severe: unstable organic soil; high water table; soft and compressible.	Severe: unstable organic soil; high water table; soft and compressible.	Severe: unstable organic soil; high water table; soft and compressible.	Severe: unstable organic soil; high water table; soft and compressible.	Severe: unstable organic soil; high water table; soft and compressible.
Moderate: slope.	Slight.	Slight.	Moderate: slope.	Slight.	Slight.
Severe: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope [4].	Moderate: slope.[4]
Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope [4].	Severe: slope.[4]

[3] Danger of pollution to underground water supplies, springs, and nearby streams because of inadequate filtration.
[4] The soils that have sandstone at a depth of 40 to 60 inches are rated severe.
[5] Ratings can be *slight* in areas protected from flooding.

honing, Fitchville, Caneadea, Olmsted, Damascus, and Wadsworth soils. In many areas, tile drains and open ditches have been installed for farm use, but excavations for homes or other structures disrupt these systems in places and introduce wetter conditions.

Glenford soils and others that have a high silt content are not so suitable for supporting house foundations as Chili and other coarser textured soils. Soils that have a high shrink-swell potential are likely to cause foundation damage unless special precautions are taken. Shrink-swell potential of the soils is rated in table 5. Slope is a limitation for homesites if grading is difficult.

Lawns, landscaping, and golf fairways.—In most areas developed for homes and golf courses, the natural surface soil, or topsoil, can be used for lawns, flowers, shrubs, and trees and should be saved. The topsoil can be removed from the site, stored until construction and grading are completed, and then returned. The natural surface soil from areas graded for streets also can be saved and used for lawns and fairways. Among the soil properties that determine whether a good lawn or golf fairway can be established are natural drainage, slope, depth to bedrock, texture of the surface soil, stoniness and rockiness, and the susceptibility to flooding.

Streets and parking lots.—The ratings in table 7 are for soils used for streets and parking lots in residential areas where traffic is not heavy. Considered in estimating the ratings were the hazard of flooding, slope, depth to bedrock and to the water table, kind of bedrock, and the degree of stoniness. The estimated soil properties and soil features that are important in designing, constructing, and maintaining highways are given in the subsection "Engineering Uses of the Soils."

Athletic fields and other intensive play areas.—Properties to consider when selecting sites to be used as athletic fields and other intensive play areas include natural drainage, slope, depth to the water table, depth to and kind of bedrock, permeability, degree of stoniness, the hazard of flooding, and the texture of the surface soil. In the table the use of fill material from other areas was not considered in the ratings. Soils on flood plains can be used as ball diamonds, picnic areas, and other intensive play areas that are not subject to costly damage by floodwater and that are not used during normal periods of flooding. The ratings given in the table for streets and parking lots are also important when considering the use of soils for tennis courts.

Parks and other extensive play areas.—Parks and other extensive play areas can be located on many kinds of soils that have severe limitations for most other uses. Flood plains, for example, can be safely developed as extensive play areas. Many areas along streams are scenic, and because of their linear shape, can be used by a relatively large number of people. Considered in rating the soils for parks and other extensive play areas were the hazard of flooding, degree of stoniness and rockiness, degree of slope, texture of the surface soil, and depth to the water table.

Campsites.—Sites suitable for tents and trailers should be located in areas suitable for unsurfaced parking lots for cars and camping trailers. Properties to consider when selecting campsites are a hazard of flooding, a seasonal high water table, permeability, the degree of slope, and soil texture. Wetness is the major limitation for campsites. Soils that have slopes of less than 12 percent are the most desirable for use as tent campsites, but trailers require less slope. Soils that have a medium-textured surface layer have fewer limitations to use as campsites than the very clayey or very sandy soils.

Sanitary landfills.—Among the properties affecting the use of soils for the trench type of sanitary landfills are depth to rock, seasonal wetness, permeability, slope, texture of the soil material, and the hazard of flooding. Deep, nearly level, well-drained soils that have slow permeability generally have the least limitations for sanitary landfills. This combination of properties, however, exists in very few soils. A high water table or excessive wetness in the form of ponding increases the difficulty of excavation and proper covering. Clayey textures are less desirable for cover than coarser textures, as they are hard to grade properly and are subject to cracking when dry. All of the soils that have bedrock within a depth of 60 inches are rated *severe*.

Cemeteries.—If they are deep, well drained, and permeable, soils have few limitations for use as cemeteries. The depth to rock and natural drainage are especially important. Other features that affect use as cemeteries are the hazard of flooding, slope, permeability, depth to the water table, and texture of the soil material.

Descriptions of the Soils

This section describes the soil series and mapping units in Summit County. The approximate acreage and proportionate extent of each mapping unit are given in table 8.

The procedure in this section is first to describe the soil series and then the mapping units in the series. Thus, to get full information on any one mapping unit, it is necessary to read the description of the unit and also the description of the soil series to which it belongs. The description of a soil series mentions features that apply to all the soils in the series. Differences among the soils of one series are pointed out in the descriptions of the individual soils or are indicated in the soil name. As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. For example, Borrow pits is a miscellaneous land type and does not belong to a soil series; nevertheless, it is listed in alphabetic order along with the series.

An essential part of each series description is the description of the soil profile, the sequence of layers beginning at the surface and continuing downward to a depth beyond which roots of most plants penetrate. The description of each soil series contains a short description of a soil profile that is typical of the series and a much more detailed description of that profile that scientists, engineers, and others can use in making highly technical interpretations.

The color of each soil horizon is described in words, such as grayish brown, but it can also be indicated by symbols, such as 10YR 5/2, describing the hue, value, and chroma. These symbols are called Munsell color notations and are used by soil scientists to indicate precisely the color of a soil. Unless otherwise stated, the color descriptions in this survey are for a moist soil.

TABLE 8.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Berks channery silt loam, 25 to 70 percent slopes	476	0.2
Bogart loam, 0 to 2 percent slopes	400	.1
Bogart loam, 2 to 6 percent slopes	1,809	.7
Bogart-Haskins loams, 2 to 6 percent slopes	320	.1
Borrow pits	402	.1
Canadice silty clay loam	1,964	.7
Caneadea silt loam, 0 to 2 percent slopes	603	.2
Caneadea silt loam, 2 to 6 percent slopes	1,812	.7
Canfield silt loam, 0 to 2 percent slopes	853	.3
Canfield silt loam, 2 to 6 percent slopes	18,478	7.0
Canfield silt loam, 6 to 12 percent slopes	862	.3
Canfield silt loam, 6 to 12 percent slopes, moderately eroded	1,165	.4
Canfield silt loam, sandstone substratum, 2 to 6 percent slopes	275	.1
Canfield-Urban land complex, undulating	10,596	4.0
Canfield-Urban land complex, rolling	2,904	1.1
Carlisle muck	6,396	2.4
Chagrin silt loam	547	.2
Chagrin silt loam, alkaline	1,796	.7
Chagrin-Urban land complex	242	.1
Chili loam, 0 to 2 percent slopes	1,804	.7
Chili loam, 2 to 6 percent slopes	10,717	4.0
Chili loam, 6 to 12 percent slopes	2,675	1.0
Chili gravelly loam, 6 to 12 percent slopes, moderately eroded	4,940	1.9
Chili gravelly loam, 12 to 18 percent slopes, moderately eroded	2,461	.9
Chili silt loam, 0 to 2 percent slopes	857	.3
Chili silt loam, 2 to 6 percent slopes	3,922	1.5
Chili silt loam, 6 to 12 percent slopes	1,503	.6
Chili-Urban land complex, undulating	11,522	4.4
Chili-Urban land complex, rolling	3,712	1.4
Chili-Wooster complex, 6 to 12 percent slopes, moderately eroded	449	.2
Chili-Wooster complex, 12 to 18 percent slopes, moderately eroded	275	.1
Chili-Wooster complex, 18 to 25 percent slopes, moderately eroded	232	.1
Clay pits and quarries	101	[1]
Conotton-Oshtemo complex, 12 to 18 percent slopes	991	.4
Conotton-Oshtemo complex, 18 to 25 percent slopes	914	.4
Conotton-Oshtemo complex, 25 to 50 percent slopes	710	.3
Damascus loam	1,390	.5
Dekalb sandy loam, 6 to 12 percent slopes	285	.1
Dekalb sandy loam, 12 to 18 percent slopes	402	.1
Dekalb sandy loam, 18 to 25 percent slopes	397	.1
Dekalb sandy loam, 25 to 70 percent slopes	591	.2
Ellsworth silt loam, 2 to 6 percent slopes	11,240	4.3
Ellsworth silt loam, 6 to 12 percent slopes	1,277	.5
Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded	6,131	2.3
Ellsworth silt loam, 12 to 25 percent slopes, moderately eroded	2,219	.8
Ellsworth silt loam, 25 to 50 percent slopes, moderately eroded	3,521	1.3
Ellsworth silt loam, sandstone substratum, 2 to 6 percent slopes	176	.1
Ellsworth silt loam, sandstone substratum, 6 to 12 percent slopes	86	[1]
Ellsworth-Urban land complex, undulating	1,500	.6
Ellsworth-Urban land complex, rolling	554	.2
Fitchville silt loam, 0 to 2 percent slopes	2,981	1.1
Fitchville silt loam, 2 to 6 percent slopes	1,861	.7
Fitchville-Urban land complex	1,082	.4
Frenchtown silt loam	405	.1
Geeburg silt loam, 2 to 6 percent slopes	837	.3
Geeburg silt loam, 6 to 12 percent slopes, moderately eroded	650	.3
Geeburg silt loam, 12 to 18 percent slopes, moderately eroded	313	.1
Glenford silt loam, 0 to 2 percent slopes	286	.1
Glenford silt loam, 2 to 6 percent slopes	2,093	.8
Glenford silt loam, 6 to 12 percent slopes, moderately eroded	1,028	.4
Glenford silt loam, 12 to 18 percent slopes, moderately eroded	648	.3
Glenford-Urban land complex, undulating	724	.3
Glenford-Urban land complex, rolling	141	[1]
Gravel pits	1,158	.4
Haskins-Caneadea complex, 2 to 6 percent slopes	305	.1
Holly silt loam	3,464	1.3
Holly silt loam, alkaline	1,198	.5
Jimtown loam, 0 to 2 percent slopes	2,015	.8
Jimtown loam, 2 to 6 percent slopes	609	.2
Jimtown-Urban land complex	882	.3
Linwood muck	330	.1
Lobdell silt loam	992	.4
Lorain silty clay loam	1,318	.5
Loudonville silt loam, 2 to 6 percent slopes	1,267	.5
Loudonville silt loam, 6 to 12 percent slopes	952	.4
Loudonville silt loam, 6 to 12 percent slopes, moderately eroded	701	.3
Loudonville silt loam, 12 to 18 percent slopes	809	.3
Loudonville silt loam, 18 to 25 percent slopes	243	.1
Loudonville-Urban land complex, rolling	506	.2
Luray silt loam	1,303	.5
Made land, chemical waste	898	.3
Made land, sanitary fill	5,041	1.9
Mahoning silt loam, 0 to 2 percent slopes	3,732	1.4
Mahoning silt loam, 2 to 6 percent slopes	11,613	4.4
Mahoning silt loam, sandstone substratum, 2 to 6 percent slopes	797	.3
Mahoning-Urban land complex	2,549	1.1
Mitiwanga silt loam, 2 to 6 percent slopes	238	.1
Olmsted loam	957	.4
Orrville silt loam	1,550	.6
Oshtemo sandy loam, 0 to 2 percent slopes	246	.1
Oshtemo sandy loam, 2 to 6 percent slopes	1,354	.5
Oshtemo sandy loam, 6 to 12 percent slopes	726	.3
Ravenna silt loam, 0 to 2 percent slopes	2,950	1.1
Ravenna silt loam, 2 to 6 percent slopes	2,620	1.0
Ravenna-Urban land complex	1,020	.4
Rittman silt loam, 2 to 6 percent slopes	10,450	4.0
Rittman silt loam, 6 to 12 percent slopes	1,201	.4
Rittman silt loam, 6 to 12 percent slopes, moderately eroded	3,624	1.4
Rittman silt loam, 12 to 18 percent slopes	337	.1
Rittman silt loam, 12 to 18 percent slopes, moderately eroded	759	.3
Rittman silt loam, 18 to 25 percent slopes, moderately eroded	222	.1
Rittman silt loam, sandstone substratum, 2 to 6 percent slopes	451	.2
Rittman silt loam, sandstone substratum, 6 to 12 percent slopes	208	.1
Rittman-Urban land complex, undulating	806	.3
Rittman-Urban land complex, rolling	185	.1
Rough broken land, clay and silt	4,460	1.7
Rough broken land, silt and sand	2,799	1.1
Sebring silt loam	6,414	2.4
Shale rock land	244	.1
Sloan silt loam	943	.4
Tioga loam	557	.2
Trumbull silt loam	1,724	.6
Urban land	4,043	1.5
Wadsworth silt loam, 0 to 2 percent slopes	2,509	1.0
Wadsworth silt loam, 2 to 6 percent slopes	4,649	1.8
Wadsworth-Urban land complex	444	.2
Wallkill silt loam	241	.1
Wheeling silt loam, 0 to 2 percent slopes	517	.2

See footnote at end of table.

TABLE 8.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Area	Extent
	Acres	*Percent*
Wheeling silt loam, 2 to 6 percent slopes	1, 702	
Willette muck	419	0. 6
Wooster silt loam, 2 to 6 percent slopes	5, 136	. 2
Wooster silt loam, 6 to 12 percent slopes	1, 408	2. 0
Wooster silt loam, 6 to 12 percent slopes, mod-		. 5
erately eroded	4, 796	1. 8
Wooster silt loam, 12 to 18 percent slopes	324	. 1
Wooster silt loam, 12 to 18 percent slopes, moderately eroded	1, 092	. 4
Wooster silt loam, 18 to 25 percent slopes, moderately eroded	356	. 1
Wooster silt loam, 25 to 50 percent slopes, moderately eroded	105	([1])
Wooster silt loam, sandstone substratum, 6 to 12 percent slopes, moderately eroded	110	([1])
Wooster silt loam, sandstone substratum, 12 to 18 percent slopes, moderately eroded	178	. 1
Wooster-Urban land complex, hilly	300	. 1
Interstate highway	3, 179	1. 2
Water	582	. 2
Total	264, 320	100. 0

[1] Less than 0.05 percent.

A symbol in parentheses follows the name of each mapping unit. It identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit and the woodland suitability group in which the mapping unit has been placed. The page on which each capibility unit is described can be found by referring to the "Guide to Mapping Units" at the back of this soil survey, and the woodland suitability group in which each soil has been placed is given in the subsection "Woodland." Many terms used in the soil descriptions and other sections of this survey are defined in the Glossary at the back of this survey and in the Soil Survey Manual *(14)*.

Berks Series

The Berks series consists of very steep, well-drained soils. These soils formed in residuum derived from weathered, acid siltstone and shale. They are on valley walls in the northwestern part of the county.

In a representative profile of a Berks soil in a wooded area, the surface layer is thin, black channery silt loam. The subsurface layer is thin, dark grayish-brown channery silt loam. The combined thickness of these two layers is 4 inches. The upper part of the subsoil is 8 inches thick and is yellowish-brown channery silt loam. The lower part of the subsoil extends to a depth of 30 inches and is light olive-brown very channery heavy silt loam. Below a depth of 30 inches is fractured siltstone bedrock.

Berks soils have moderately rapid permeability. The rooting zone is moderately deep, and the available moisture capacity is low. The rooting zone is mostly very strongly acid where these soils have not been limed. Most of the acreage is wooded. Because of very steep slopes, these soils generally are not suited to uses other than woodland.

Representative profile of Berks channery silt loam, 25 to 70 percent slopes, in an area of red oak and white oak woodland located in Northfield Center (T. 5 N., R. 11 W.), 2,000 feet north of Twinsburg Road, 1,100 feet northwest of Schoepf Road, and 100 feet west of Brandywine Creek:

A1—0 to 2 inches, black (10YR 2/1) channery silt loam; moderate, fine, crumb structure; very friable; 15 to 20 percent siltstone fragments; extremely acid; clear, wavy boundary.

A2—2 to 4 inches, dark grayish-brown (10YR 4/2) channery silt loam; moderate, fine, crumb structure; very friable; 15 to 20 percent siltstone fragments; very strongly acid; clear, wavy boundary.

B21—4 to 12 inches, yellowish-brown (10YR 5/4) channery silt loam; moderate, medium, subangular blocky structure; friable; 15 to 20 percent siltstone fragments; very strongly acid; clear, smooth boundary.

B22—12 to 30 inches, light olive-brown (2.5Y 5/4) very channery heavy silt loam; moderate, medium, subangular blocky structure grading to weak, medium, subangular blocky structure with increasing depth; friable; thin, very patchy clay films; 50 to 60 percent siltstone fragments; strongly acid; clear, irregular boundary.

R—30 to 60 inches, fractured siltstone bedrock.

The solum ranges from 20 to 40 inches in thickness, which is the same as the depth to siltstone bedrock. The content of coarse fragments increases from about 15 percent in the A horizon to more than 50 percent in the B22 horizon. Reaction ranges from extremely acid or very strongly acid in the A horizon to strongly acid or medium acid in the B22 horizon. The A1 horizon commonly is less than 4 inches thick and is black (10YR 2/1) or very dark grayish-brown (10YR 3/2). The A2 horizon is 2 to 6 inches thick and is grayish-brown (10YR or 2.5Y 5/2) or dark grayish-brown (10YR 4/2).

The B horizon has hues of 10YR and 2.5Y, value of 5, and chroma of 4. The B22 horizon is dominantly very channery silt loam and has moderate and weak, medium, subangular blocky structure. Some thin, very patchy clay films are evident in the B22 horizon. Cracks and fractures in the siltstone bedrock are filled with material similar to that in the B horizon.

Berks soils are in positions similar to those of the Loudonville and Dekalb soils. They formed in residual material, whereas Loudonville soils formed in glacial material. Berks soils lack the Bt horizon that is characteristic of Loudonville soils. They are less sandy throughout the profile than the Dekalb soils, which formed in residuum weathered from sandstone.

Berks channery silt loam, 25 to 70 percent slopes (BeF).—This soil is on the sidewalls of valleys of the Cuyahoga River and its tributaries. Included in mapping are a few areas where slopes are less than 25 percent, some areas where shale and siltstone are exposed, and some areas where the subsoil is more clayey than is typical for the Berks series.

Very steep slopes are a major limitation to most uses of this soil. Seepage is a limitation in a few areas. High points on the wooded slopes provide scenic overlooks into the valley below. Erosion in cleared areas of this soil is a potential source of high amounts of sediment

that is carried in adjacent rivers and streams. Capability unit VIIe-1; woodland suitability group 3f1.

Bogart Series

The Bogart series consists of nearly level to gently sloping, moderately well drained soils on outwash terraces throughout the county. These soils formed in glacial outwash of Wisconsin age.

In a representative profile of a Bogart soil that has been cultivated, the plow layer is brown loam about 7 inches thick. The subsoil is about 33 inches thick. The upper 6 inches of the subsoil is friable, dark-brown loam; the next 14 inches is friable, mottled, dark yellowish-brown and brown sandy loam; the next 6 inches is friable, mottled, light yellowish-brown loamy sand; and the lower 7 inches is friable, light brownish-gray and very dark grayish-brown light sandy loam. The underlying material, between depths of 40 and 48 inches, is loose, light brownish-gray and yellowish-brown sand. Below this, to a depth of 64 inches, it is loose, brown sandy loam.

Bogart soils have moderately rapid permeability in the upper 36 to 50 inches. Permeability in the coarser underlying material is rapid. A high water table is present for short periods in winter and spring. The rooting zone is moderately deep to deep and very strongly acid, and the available moisture capacity is medium to low.

Some areas of Bogart soils are cultivated, but most cleared areas are not presently farmed. The main crops grown are corn, wheat, and grass-legume meadow.

Representative profile of Bogart loam, 0 to 2 percent slopes, in an area formerly cultivated, in West Akron between Himelright Avenue and Interstate Route 77, about 350 feet north of Red Bush Road (sample No. ST-26 in table 10):

Ap—0 to 7 inches, brown (10YR 4/3) loam; weak, fine, granular structure; friable; very strongly acid; abrupt, smooth boundary.

B1—7 to 13 inches, dark-brown (7.5YR 4/4) loam; weak, medium, subangular blocky structure; friable; very strongly acid; clear, smooth boundary.

B21t—13 to 21 inches, dark yellowish-brown (10YR 4/4) sandy loam; common, medium, faint, yellowish-brown (10YR 5/6) mottles and a few, medium, distinct, light brownish-gray (10YR 6/2) mottles; weak, medium, subangular blocky structure; friable; few, very dark grayish-brown (10YR 3/2) oxide stains; sandy grains are coated and bridged with clay; very strongly acid; clear, wavy boundary.

B22t—21 to 27 inches, brown (10YR 4/3) light sandy loam; common, fine, distinct, light brownish-gray (10YR 6/2) mottles; massive; friable; common, patchy, very dark grayish-brown (10YR 3/2) oxide stains; 10 percent fine pebbles; thin, patchy, brown (10YR 4/3) clay films and clay bridging of sand grains; very strongly acid; clear, smooth boundary.

B23t—27 to 33 inches, light yellowish-brown (10YR 6/4) loamy sand; common, medium, distinct, light brownish-gray (10YR 6/2) mottles; single grain; friable; clay bridging and thin patchy clay films; some interfingering lamellae of dark-brown (7.5YR 4/4) clay-enriched zones; 10 percent fine pebbles; strongly acid; clear, smooth boundary.

B3—33 to 40 inches, light brownish-gray (10YR 6/2) and very dark grayish-brown (10YR 3/2) light sandy loam; single grain; friable; 5 percent pebbles; very strongly acid; gradual, smooth boundary.

C1—40 to 48 inches, light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/4) sand; single grain; loose; 10 percent fine pebbles; strongly acid; clear, wavy boundary.

C2—48 to 64 inches, brown (10YR 4/3) sandy loam; single grain; loose; 10 percent fine pebbles; strongly acid.

The solum ranges from 36 to 50 inches in thickness. The Ap horizon is dominantly loam but is silt loam in places. This horizon is dark grayish-brown (10YR 4/2) or brown (10YR 4/3). In the upper 20 inches of the Bt horizon, the matrix has hues of 10YR and 7.5YR, value of 4 or 5, and chroma of 3 to 6, and common to many light brownish-gray (10YR 6/2), grayish-brown (10YR 5/2), or dark grayish-brown (10YR 4/2) mottles are within the upper 10 inches. The Bt horizon is gravelly loam, gravelly sandy loam, loam, sandy loam, or loamy sand and ranges from 20 to 30 inches in thickness. In some profiles part of this horizon is light sandy clay loam or light clay loam. The weighted average clay content of the upper 20 inches of the Bt horizon ranges from 10 to 18 percent. Structure of the B21t horizon is typically weak but ranges to moderate. The B22t and B23t horizons are massive or single grain. Gravel content ranges from 5 to 50 percent in the lower part of the B horizon and in the C horizon.

The Bogart soils in this county have a slightly lower weighted average content of clay than Bogart soils elsewhere. Profiles having less than 18 percent clay content are dominant in the county, although profiles having more than 18 percent clay content occur in some places.

Bogart soils are the moderately well drained members of a drainage sequence that includes the well drained Chili soils, the somewhat poorly drained Jimtown soils, the poorly drained Damascus soils, and the very poorly drained Olmstead soils. They are commonly adjacent to Glenford, Chili, and Jimtown soils. Bogart soils are similar to Chili soils, except that they have gray mottles in the B horizon. They are less gray in the B horizon than the Jimtown soils. Bogart soils have a less silty and more gravelly B horizon and a much coarser C horizon than Glenford soils.

Bogart loam, 0 to 2 percent slopes (BgA).—This soil is on outwash terraces in areas that are seldom more than 10 acres in size. A profile of this soil is described as representative for the series. Tilth generally is good, even where the organic-matter content is low. Included in mapping are some areas of soils that have a silt loam surface layer. These soils are more susceptible to surface crusting than those that have a loam surface layer. Also included in mapping are small spots of Glenford soils and small spots of the wetter Jimtown soils. The Jimtown soils generally are in low areas on the landscape.

Runoff is slow, and there is little or no hazard of erosion. This soil tends to be droughty, but in most years rainfall is timely enough that little or no crop damage results. The soil is well suited to irrigation. The temporary seasonal high water table is a limitation to many nonfarm uses of this soil. Capability units IIs-1; woodland suitability group 2o1.

Bogart loam, 2 to 6 percent slopes (BgB).—This soil is in small areas that are seldom more than 10 acres in size. It generally is easy to till and dries more quickly in spring than the less sloping Bogart soil. Included in mapping are a few areas that have a silt loam surface layer, a few areas of well-drained Chili soils having steeper slopes, and a few areas of Glenford soils on the most nearly level parts of the landscape.

Runoff is medium. Erosion is a hazard if the soil is cultivated or is disturbed by construction. This soil tends to be droughty, but generally rainfall is timely enough that little or no crop damage results. This soil is suited to irrigation. A seasonally high water table for short

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periods in winter and spring is a limitation to some nonfarm uses of this soil. Capability unit IIe-1; woodland suitability group 2o1.

Bogart-Haskins loams, 2 to 6 percent slopes (BhB).—The gently undulating soils in this complex are mostly on terraces in the northern part of the county. Bogart soils make up about 50 percent of the complex, Haskins soils about 40 percent, and Jimtown soils about 10 percent. Bogart soils formed in fairly thick outwash material. Haskins soils formed in thin outwash material and the underlying glacial or clayey material that is within a depth of 20 to 40 inches. Haskins soils are wetter than Bogart soils. Haskins and Jimtown soils are somewhat poorly drained.

Runoff is medium, and erosion is a moderate hazard in areas where runoff is concentrated. Because Bogart and Haskins soils are seasonally wet, wetness is a limitation to some nonfarm uses. Seasonal wetness is more severe on Haskins soils than it is on Bogart soils. Capability unit IIe-1; woodland suitability group 2o1.

Borrow Pits

Borrow pits (Bp) consists of areas from which soil material has been removed. Most borrow pits were formed during construction of interstate highways. The pits range from about 2 to 100 acres in size.

The exposed soil material generally is the subsoil and substratum of the original soil. This material commonly is silt loam, silty clay loam, or clay loam. It is low in natural fertility and is calcareous in places. It commonly has a poor physical condition and is low in available moisture capacity and content of organic matter. Vegetative seedings are difficult to establish in borrow pits.

Some of these pits are filled with water and are suited to development as wetland wildlife habitat or areas for water sports. Areas not filled with water have a potential for development as upland wildlife habitat.

These areas are not farmed. Capability unit not assigned; woodland suitability group 4.

Canadice Series

The Canadice series consists of nearly level to slightly depressional, poorly drained soils on terraces, mainly in the northern part of the county. These soils formed in clayey, water-deposited sediment.

In a representative profile of a Canadice soil in a wooded area, the surface layer is very dark grayish-brown silty clay loam about 3 inches thick. The subsurface layer is gray, friable silty clay loam about 6 inches thick. The subsoil, to a depth of 30 inches, is firm, gray silty clay. Below this, to a depth of 38 inches, it is firm, light olive-brown silty clay. The underlying material, to a depth of 60 inches or more, is firm, calcareous, brown silty clay.

Canadice soils have very slow permeability. They are saturated with free water for a period late in winter, in spring, and early in summer; they dry out slowly in spring. The rooting zone in these soils is moderately deep in summer, and the available moisture capacity is medium. The rooting zone is strongly acid to very strongly acid. Canadice soils are low in content of organic matter and tend to form clods if they are worked when wet.

Few areas of Canadice soils are cultivated. Most areas lack the adequate drainage needed for growing crops or for good pasture. Most areas are wooded or are in brush.

Representative profile of Canadice silty clay loam, in a wooded area, 2 miles east-northeast of Twinsburg in Twinsburg Township, T. 5 N., R. 10 W., 2,200 feet southwest of Aurora Pond, 4,000 feet north of State Route 82, and 1,600 feet west of Portage County line (sample No. ST-20 in table 10):

O1—3 inches to 1 inch, undecomposed leaves and twigs.

O2—1 inch to 0, dark reddish-brown (5YR 3/2), fiberous root mat and partly decomposed leaves.

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, fine, granular structure; very friable; many roots; extremely acid; clear, wavy boundary.

A2g—3 to 9 inches, gray (5Y 6/1) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, platy structure; friable; common roots; few fine pores; very strongly acid; clear, wavy boundary.

B21tg—9 to 15 inches, gray (5Y 6/1) silty clay; common, distinct, fine and medium, yellowish-brown (10YR 5/6) mottles; moderate, medium, prismatic structure parting to moderate, medium, angular blocky structure; firm; common roots; thin, patchy, gray (5Y 5/1) clay films on ped faces; thin, patchy, gray (5Y 6/1) silt coatings on ped faces; clay films are more numerous on vertical ped faces; thin, very patchy, clay films in pores and in ped interiors; strongly acid; clear, smooth boundary.

B22tg—15 to 30 inches, gray (5Y 5/1) silty clay; many, medium, distinct, olive-brown (2.5Y 4/4) mottles; strong, medium and coarse, prismatic structure parting to strong, medium and coarse, angular blocky structure; firm; few roots along vertical ped faces; thin, continuous, gray (5Y 5/1) clay films on vertical faces; thin, patchy, gray (5Y 5/1) clay films on horizontal faces; slightly acid; clear, wavy boundary.

B3t—30 to 38 inches, light olive-brown (2.5Y 5/4) silty clay; many, medium, distinct, gray (N 5/0) mottles; strong, coarse, prismatic structure parting to moderate, coarse, angular blocky structure; firm; thin, patchy, gray (5Y 5/1) clay films on vertical and horizontal ped faces; common, medium, light-gray (5Y 7/2) carbonatic accumulations in ped interiors; mildly alkaline; ped interiors are strongly calcareous; gradual, wavy boundary.

C—38 to 60 inches, brown (10YR 4/3) silty clay; many, coarse, prominent, gray (N 5/0) mottles; massive parting to coarse, angular blocky structure; firm; mildly alkaline and calcareous.

The solum generally is less than 40 inches thick. The depth to carbonates ranges from 30 to 45 inches. The A1 horizon ranges from 1 to 4 inches in thickness and is typically very dark grayish brown (10YR 3/2) or very dark gray (10YR 3/1) in color. The A2 horizon is 3 to 9 inches thick and gray (10YR 5/1) to light gray (5Y 6/1). In areas that have been plowed, the A1 and A2 horizons are mixed. The Ap horizon is dark gray (10YR 4/1).

In the upper 6 to 15 inches of the B horizon, gray silt coatings are on vertical faces of peds and on some horizontal faces. The B21 horizon is strongly acid to medium acid, and the texture is typically silty clay but in places is silty clay loam. The B22 horizon is medium acid in the upper part and ranges to neutral in the lower part. The weighted average clay content in the upper 20 inches of the Bt horizon ranges from 40 to 60 percent. The B horizon typically has a moderate to strong, medium to coarse, prismatic structure that parts easily to moderate to strong, angular blocky structure. The matrix of the B2 horizon, to a depth of 30 inches or more, has hues of 10YR to 5Y, value of 4 to 6, and chroma of 0, 1, or 2. Mottles in the

B2t horizon are yellowish brown (10YR 5/4 to 5/8) and olive brown (2.5Y 4/4).

Canadice soils are the poorly drained members of a drainage sequence that includes the moderately well drained Geeburg soils, the somewhat poorly drained Caneadea soils, and the very poorly drained Lorain soils. They are commonly adjacent to Mahoning, Geeburg, Caneadea, Sebring, and Fitchville soils. Canadice soils contain more clay than Sebring and Fitchville soils. They contain fewer stones and less sand than Mahoning soils, and they are more gray in the B horizon.

Canadice silty clay loam (Ca).—This soil is nearly level to slightly depressional. Most areas are 5 to 20 acres in size. Included in mapping are small spots of soils in shallow depressions that are very poorly drained. These spots have a mucky dark-colored surface layer 1 to 4 inches thick. Also included are small areas of Caneadea soils in slightly elevated areas. Small areas of this soil along Brandywine Creek have pockets of buried muck at a depth of 3 feet or more.

Runoff is slow to ponded. Seasonal wetness and very slow permeability are limitations to most uses of this soil. Drainage by tile is difficult. Capability unit IVw–1; woodland suitability group 2w1.

Caneadea Series

The Caneadea series consists of nearly level to gently sloping, deep, somewhat poorly drained soils on terraces, mainly in the northern part of the county. These soils formed in clayey, water-deposited sediment in glacial lakes.

In a representative profile of a Caneadea soil that has been cultivated, the plow layer is dark grayish-brown silt loam about 7 inches thick. The subsoil, to a depth of 12 inches is mottled, firm, yellowish-brown silty clay loam. Below this, to a depth of 43 inches, it is mottled, firm, brown silty clay. Peds in the upper 20 inches of the subsoil have gray silt coatings. The underlying material, to a depth of 60 inches, is calcareous, dark yellowish-brown silty clay loam.

Caneadea soils have very slow permeability in the subsoil and underlying material. They are saturated with free water late in winter and in spring, and they dry out slowly in the spring. The rooting zone in these soils is mostly deep, and the available moisture capacity is medium. The rooting zone is strongly acid or very strongly acid in the upper part.

Most areas of Caneadea soils have been farmed or used for pasture, but most of these areas are not presently farmed or used for pasture, and many areas are reverting back to woodland. Artificial drainage is beneficial to crops.

Representative profile of Caneadea silt loam, 0 to 2 percent slopes, in a cultivated field, 1¾ miles east southeast of Twinsburg in Twinsburg Township, T. 5 N., R. 10 W., 800 feet north of State Route 82 along gas pipeline right-of-way.

Ap—0 to 7 inches, dark grayish-brown (2.5Y 4/2) silt loam; moderate, medium, granular structure; friable; slightly acid; abrupt, smooth boundary.

B1—7 to 12 inches, yellowish-brown (10YR 5/4) silty clay loam; many, medium, distinct, gray (5Y 6/1) mottles; strong, medium, subangular blocky structure; firm; gray (5Y 5/1) silt coatings; thin, very patchy, gray (5Y 5/1) clay films on ped faces; very strongly acid; clear, smooth boundary.

B21tg—12 to 20 inches, dark yellowish-brown (10YR 4/4) silty clay; many, medium, distinct, gray (5Y 6/1) mottles; strong medium prismatic structure parting to strong subangular blocky structure; firm; gray (5Y 5/1) silt coatings; medium, patchy, gray (5Y 5/1) clay films on vertical and horizontal ped faces; strongly acid; clear, wavy boundary.

B22tg—20 to 29 inches, dark yellowish-brown (10YR 4/4) silty clay; many, medium, distinct, gray (5Y 5/1) mottles; moderate, medium, prismatic structure parting to moderate, medium, subangular blocky structure; firm; medium, patchy, dark-gray (10YR 4/1) clay films on ped faces; medium acid; clear, smooth boundary.

B3tg—29 to 43 inches, dark yellowish-brown (10YR 4/4) silty clay; many, medium, distinct, gray (5Y 5/1) mottles; moderate, coarse, prismatic structure; firm; medium, continuous, gray (5Y 5/1) clay films on vertical ped faces; slightly acid; gradual, wavy boundary.

C—43 to 60 inches, dark yellowish-brown (10YR 4/4) silty clay loam; many, medium, distinct, gray (5Y 5/1) mottles; friable; moderately alkaline and calcareous.

The thickness of the solum and depth to carbonates range from 36 to 48 inches. The matrix color of the B1 horizon is yellowish brown (10YR 5/4 and 5/6) and brown (10YR 5/3). The ped faces are coated light brownish gray (2.5Y 6/2) or gray (5Y 5/1 and 6/1). The matrix color of the B2t horizon is yellowish brown (10YR 5/4 and 5/6), dark brown (10YR 4/3), dark yellowish brown (10YR 4/4) and olive brown (2.5Y 4/4). The color of the ped coatings is gray (5Y 5/1 and 6/1), grayish brown (2.5Y 5/2), and dark gray (10YR 4/1 or 5Y 4/1). Weighted average clay content of the upper 20 inches of the Bt horizon ranges from 40 to 60 percent, but is typically about 55 percent. Depth to the Bt horizon ranges from 10 to 14 inches. Reaction ranges from very strongly acid to medium acid in the upper part of the B horizon and from medium acid to slightly acid in the lower part.

Caneadea soils are the somewhat poorly drained members of a drainage sequence that includes the moderately well drained Geeburg soils, the poorly drained Canadice soils, and the very poorly drained Lorain soils. They are commonly adjacent to Mahoning, Canadice, Fitchville, and Sebring soils. Caneadea soils contain more clay than Fitchville and Sebring soils. They contain fewer stones and less sand than Mahoning soils.

Caneadea silt loam, 0 to 2 percent slopes (CcA).—This soil is on terraces. Most areas are circular and are 2 to 10 acres in size. A profile of this soil is described as representative for the series. Included in mapping are small spots of poorly drained Canadice soils that are wetter than this Caneadea soil. These inclusions are in shallow drainageways and depressional areas.

Runoff is slow, and ponding is likely during periods of heavy rainfall. Seasonal wetness is a limitation for farming. Wetness and very slow permeability are limitations to many nonfarm uses of this soil. Capability unit IIIw–3; woodland suitability group 2w2.

Caneadea silt loam, 2 to 6 percent slopes (CcB).—This soil is on undulating terraces. Most areas are 5 to 20 acres in size. Included in mapping are small knolls of moderately well drained Glenford and Geeburg soils, and areas of soils that have a silt mantle ranging from 10 to 24 inches in thickness. Also included, particularly in shallow drainageways and depressions, are small spots of poorly drained Canadice soils. These Canadice soils are wetter than this Caneadea soil.

Runoff is rapid, and some areas are moderately eroded. The moderately eroded areas commonly have a more sticky, more clayey surface layer than uneroded areas. This soil is more susceptible to erosion than less sloping

Caneadea soils. Seasonal wetness is the major limitation of this soil for farming. Seasonal wetness and very slow permeability are limitations to many nonfarm uses. Capability unit IIIw–3; woodland suitability group 2w2.

Canfield Series

The Canfield series consists of deep, moderately well drained, nearly level to sloping soils that have a fragipan. These soils formed in loam and silt loam glacial till of Wisconsin age. They are on uplands in the southern half of the county.

In a representative profile of a Canfield soil that has been cultivated, the plow layer is brown silt loam about 8 inches thick. The upper part of the subsoil, to a depth of 20 inches, is firm, yellowish-brown silt loam and dark yellowish-brown loam. The lower part, between depths of 20 to 44 inches, is a dense and compact, dark-brown to brown loam fragipan. Below the fragipan, the underlying material is firm brown loam glacial till that contains pebbles and fragments of sandstone and siltstone.

The movement of water within the soil is restricted by the dense, compact fragipan. Permeability is moderate above the fragipan and is slow in and below it. A perched water table is within 2 feet of the surface during wet periods. When the soils are saturated, water tends to flow laterally on top of the fragipan. The rooting zone is moderately deep and very strongly acid, and available moisture capacity is medium above the fragipan. Some roots penetrate into vertical cracks in the fragipan and remove moisture at lower depths.

Much of the acreage is cultivated, but some is in residential areas or is wooded. The main crops are corn, wheat, and grass-legume meadow.

Representative profile of Canfield silt loam, 2 to 6 percent slopes, in a formerly cultivated field in Portage Lakes State Park, approximately 1 mile west of Turkeyfoot Lake, 2,000 feet east of Manchester Road, and 1,500 feet north of Renninger Road, SW¼ sec. 14, Franklin Township (sample No. ST–5 in table 10):

Ap—0 to 8 inches, brown (10YR 4/3) silt loam; weak, medium, granular structure; friable; many roots; 2 percent coarse fragments; very strongly acid; abrupt, smooth boundary.

B1—8 to 13 inches, yellowish-brown (10YR 5/4) silt loam; moderate, medium, subangular blocky structure; firm; common roots; 2 percent coarse fragments; very strongly acid; clear, smooth boundary.

B2t—13 to 20 inches, dark yellowish-brown (10YR 4/4) loam; common, fine, distinct, yellowish-brown (10YR 5/8) and light brownish-gray (2.5Y 6/2) mottles; weak, medium, subangular blocky structure; firm; few roots; thin, very patchy, dark grayish-brown (10YR 4/2) clay films on ped faces; 5 percent coarse fragments; very strongly acid; clear, smooth boundary.

Bx1—20 to 26 inches, dark-brown (10YR 4/3) loam; moderate, coarse, prismatic structure (6 to 8 inches between prisms); very firm, brittle; few roots along ped faces; thin, patchy, dark grayish-brown (10YR 4/2) clay films on vertical faces and in interior pores; patchy light-gray (10YR 7/1) silt coatings on vertical faces; common, fine, black (10YR 2/1) oxide stains; 5 percent coarse fragments; very strongly acid; clear, smooth boundary.

Bx2—26 to 33 inches, dark-brown (10YR 4/3) loam; common, fine, distinct, strong-brown (7.5YR 5/6) mottles; weak, very coarse, prismatic structure; very firm, brittle; thin to medium, continuous, gray (5Y 5/1) clay films on ped faces; a thin rind of yellowish-brown (10YR 5/8) adjacent to clay films; common, black (10YR 2/1) oxide stains; 5 percent coarse fragments; strongly acid; clear, smooth boundary.

Bx3—33 to 44 inches, brown (10YR 4/3) loam; weak, very coarse, prismatic structure (polygons coarser than in horizon above); very firm, brittle; thin, continuous, gray (5Y 5/1) clay films on vertical faces; a thin periphery of yellowish-brown (10YR 5/8) color adjacent to clay films; common, black (10YR 2/1) oxide stains; 10 percent coarse fragments; medium acid, clear, wavy boundary.

C—44 to 79 inches, brown (10YR 4/3) loam; massive; firm; 10 percent coarse fragments; slightly acid.

The solum ranges from 45 to 60 in thickness. In places a silt mantle up to 20 inches thick occurs on Canfield soils. The Ap horizon is dark grayish brown (10YR 4/2) or brown (10YR 4/3) in color. Areas that have never been plowed have a 1-to 5-inch A1 horizon that is very dark gray (10YR 3/1) or very dark grayish brown (10YR 3/2). An A2 horizon, where present, is 4 to 7 inches thick and dark grayish brown (10YR 4/2) or yellowish brown (10YR 5/4). Mottles having a chroma of 2 or less generally are absent in the A2 and B1 horizons but occur within 10 inches below the top of the Bt horizon. Typically they occur 4 to 6 inches above the top of the fragipan.

The Bt horizon above the fragipan ranges from 7 to 14 inches in thickness. It is yellowish brown (10YR 5/4) or dark yellowish brown (10YR 4/4). Depth to the Bt horizon ranges from 12 to 17 inches, and texture is loam, silt loam, and light silty clay loam. Where the Bt horizon is finer textured, the clay content is 25 to 29 percent. The weighted average clay content of the Bt horizon ranges from 19 to 26 percent.

The top of the fragipan (Bx horizon) is at a depth ranging from 20 to 29 inches but generally is at a depth of about 23 inches. The fragipan is loam and silt loam, is 22 to 31 inches thick, and typically has very coarse and coarse prismatic structure. It is 20 to 40 percent sand and 45 to 60 percent silt. The polygons or prisms are 5 to 18 inches across and are coated with gray (10YR 5/1 or 6/1), light brownish-gray (2.5Y 6/2), and light-gray (10YR 7/1) silt coatings in the upper part and dark-gray (10YR 4/1), gray (10YR 5/1 or 5Y 5/1), or grayish-brown (2.5Y 5/2) clay films throughout. A thin, yellowish-brown (10YR 5/8) rind occurs between the gray zone and the interior of the polygons. The polygon interiors are brown (10YR 4/3) and dark yellowish brown (10YR 4/4).

Canfield soils are the moderately well drained members of a drainage sequence that includes the well drained Wooster soils, the somewhat poorly drained Ravenna soils, and the poorly drained Frenchtown soils. They commonly are adjacent to their drainage associates and to Chili, Jimtown, and Fitchville soils. Canfield soils have a fragipan that is lacking in Chili, Jimtown, and Fitchville soils. They are moderately well drained, whereas Chili soils are well drained and Jimtown and Fitchville soils are somewhat poorly drained.

Canfield silt loam, 0 to 2 percent slopes (CdA).—This soil is mainly in Copley Township. In most areas sandstone bedrock is within a depth of 5 to 10 feet. Included in mapping are areas of well-drained soils that do not have a fragipan.

Runoff is slow, and there is little or no hazard of erosion. Slow permeability is a limitation to some nonfarm uses of this soil. Capability unit IIw–4; woodland suitability group 1o1.

Canfield silt loam, 2 to 6 percent slopes (CdB).—A profile of this soil is described as representative for the series. Most areas range from 10 to 100 acres in size. Included in mapping are a few spots of well-drained Wooster soils, mainly where slopes range from 4 to 6

percent; small spots of somewhat poorly drained Ravenna soils on more nearly level parts of the landscape; and a few areas of moderately eroded soils that have a plow layer that is a mixture of the original surface layer and part of the subsoil.

Some areas of this Canfield soil, along the west side of Pancake Creek in Franklin Township, have a silt mantle as much as 3 feet thick. Where slopes are long, internal water tends to move laterally downslope and comes to the surface as seeps in less sloping areas. Runoff is medium, and the hazard of erosion is moderate if the soil is cultivated. Slow permeability is a limitation to many nonfarm uses of this soil. Capability unit IIe-3; woodland suitability group 1o1.

Canfield silt loam, 6 to 12 percent slopes (CdC).—This soil is in smooth areas on the sides of valleys or in complex rolling areas on uplands. Most areas are wooded. Included in mapping, particularly where the landscape is rolling, are small areas of the well-drained Wooster soils. Also included are small areas of moderately eroded soils, which make up as much as 15 percent of some areas mapped as this Canfield soil.

Runoff is rapid, and the hazard of erosion is greater than on the less sloping Canfield soils. The hazard is severe if the soil is cultivated. Slope and slow permeability are limitations to many nonfarm uses of this soil. Capability unit IIIe-3; woodland suitability group 1o1.

Canfield silt loam, 6 to 12 percent slopes, moderately eroded (CdC2).—This soil is mainly adjacent to drainageways. About 50 percent of the original surface layer has been removed through erosion. The present plow layer is a mixture of the surface layer and some of the yellowish-brown subsoil. This soil has more pebbles and coarse fragments on the surface, is shallower to the fragipan, and is more droughty than less eroded Canfield soils. Included in mapping are a few spots of well-drained Wooster soils.

The content of organic matter is low, and the rooting zone is shallow. Water commonly moves laterally downslope on top of the fragipan, and seeps on lower slopes are fairly common. Runoff is rapid, and the hazard of erosion is severe if the soil is cultivated. Slope and slow permeability are limitations to many nonfarm uses of this soil. Capability unit IIIe-3; woodland suitability group 1o1.

Canfield silt loam, sandstone substratum, 2 to 6 percent slopes (CeB).—This soil is in the southern part of the county. It has a profile similar to the one described as representative for the series, but it is underlain by sandstone bedrock at a depth of 40 to 60 inches. In some areas in southern Norton and Franklin Townships, coal mine tunnels have been dug beneath this soil. Included in mapping are spots in which the depth to bedrock is more than 60 inches.

Runoff is moderate, and erosion is a moderate hazard if the soil is cultivated. The depth to bedrock and slow permeability are limitations to some nonfarm uses of this soil. Capability unit IIe-3; woodland suitability group 1o1.

Canfield-Urban land complex, undulating (CfB).—This mapping unit consists of areas where the original Canfield soils have been largely disturbed, removed, or covered by grading and digging. Most areas are used for urban or industrial development. Borrow or fill material from grading and digging makes up 50 to 75 percent of the mapping unit, but the soils are undisturbed in undeveloped lots, in the back part of developed lots, and in small patches of woodland.

Fill areas typically consist of about 1 to 3 feet of fill material overlying undisturbed Canfield soils or inclusions of Wooster soils. The fill is mainly loamy material from the subsoil or substratum of Sanfield soils. In the borrow areas, the substratum or subsoil of these soils is exposed.

The surface layer of the disturbed soil commonly has a low organic-matter content and poor tilth. It tends to become hard as it dries, and the range of moisture content suitable for optimum tillage is narrow. The hazard of erosion is particularly severe if the soil is bare of vegetation during construction. Seepage downslope is common in wet periods. When the soil is dry, the fragipan is difficult to excavate. Capability unit not assigned; woodland suitability group 1o1.

Canfield-Urban land complex, rolling (CfC).—This mapping unit is in areas where the original Canfield soils have been largely disturbed, removed, or covered as a result of grading and digging. Most areas are used for urban or industrial development. Borrow or fill areas make up 50 to 75 percent of the mapping unit, but the soils are undisturbed in undeveloped lots, in the back part of developed lots, and in small patches of woodland.

Fill areas typically consist of about 1 to 3 feet of soil material overlying undisturbed Canfield soils or inclusions of Wooster soils. The fill is loamy material from the subsoil and substratum of these soils. The borrow areas generally are places where the subsoil and substratum of the Canfield soils are exposed.

The surface layer of the disturbed soil commonly has a low content of organic matter and is in poor tilth. It tends to become hard as it dries.

The hazard of erosion is severe, particularly if the soil is bare of vegetation during construction. Runoff is rapid, and downslope seepage is common in wet periods. When the soil is dry, the fragipan is difficult to excavate. Capability unit not assigned; woodland suitability group 1o1.

Carlisle Series

The Carlisle series consists of very poorly drained organic soils in broad, low-lying bogs and kettles in many parts of the county. These soils formed in muck and peat deposits that are more than 51 inches thick.

In a representative profile of a Carlisle soil in a wooded area, the surface layer is black muck about 10 inches thick. The underlying material, between depths of 10 inches and 55 or more, consists of layers of dark reddish-brown, black, and very dark grayish-brown muck. This material is very friable and is medium acid to slightly acid.

Carlisle soils have moderately rapid permeability in the layers of muck. Because clayey material below the muck has slow permeability, the water table is at or near the surface unless these soils are drained. Where the soils have not been drained, the rooting zone in these soils is very shallow. It is medium acid, and available moisture capacity is very high.

About a third of the acreage of Carlisle soils is wooded, another third is used for potatoes, sweet corn, vegetables, or sod, and the rest is idle cropland.

Representative profile of Carlisle muck, in a nearly level cultivated field in West Akron, about 4,000 feet south of Copley Road, and 300 feet east of Collier Road:

Oa1—0 to 10 inches, black (10YR 2/1) muck (sapric material); strong, very fine, granular structure; loose; about 10 to 20 percent fibers unrubbed, about 2 percent fibers rubbed; medium acid; abrupt, smooth boundary.

Oa2—10 to 26 inches, dark reddish-brown (5YR 2/2) on broken face, black (10YR 2/1) rubbed; muck (sapric material); about 10 to 20 percent fiber, 2 percent rubbed; moderate, medium, platy structure; friable; medium acid; clear, smooth boundary.

Oa3—26 to 40 inches, black (10YR 2/1) muck (sapric material); 5 to 10 percent fiber, 2 percent rubbed; massive; friable; medium acid; clear, smooth boundary.

Oa4—40 to 55 inches, very dark grayish-brown (10YR 3/2) muck (sapric material); 10 to 20 percent fiber, 5 percent rubbed; massive; friable; slightly acid.

Carlisle soils have organic layers that are more than 51 inches thick. The Oa1 horizon ranges from black (10YR 2/1) to very dark brown (10YR 2/2), and the Oa2, Oa3, and Oa4 horizons range from black (10YR 2/1) to dark reddish brown (5YR 2/2) and very dark brown (10YR 2/2) to dark brown (7.5YR 3/2). The reaction ranges from medium acid to very strongly acid. The material below a depth of 24 inches generally is high in fiber content, but generally is not more than 10 percent when rubbed. Wood fragments in the lower layers are common.

Carlisle soils are on positions in the landscape similar to those of the very poorly drained Linwood, Lorain, Luray, Olmsted, Willette, and Sloan soils. They formed in thicker organic material than Willette or Linwood soils. Carlisle soils are organic soils, but Lorain, Luray, Olmsted, and Sloan soils are mineral soils.

Carlisle muck (Cg).—Areas of this nearly level to depressional organic soil range from 2 to 1,000 acres in size. The thickness of organic deposit ranges from about 4½ feet to as much as 100 feet in some kettles. In the Copley Swamp area, the organic material is commonly 10 to 30 feet thick. Included in mapping are areas of soils where the organic material is as thin as 40 inches and a few areas of soils that have an overwash of mineral material 6 to 10 inches thick.

This swampy soil is too wet for most uses unless it is drained. It is subject to subsidence and is highly unstable if used for structures. Drained areas, when dry, are subject to severe soil blowing and damage by fire. Crop production on this soil requires intensive management, but the soil is well suited to vegetables if it is drained. Capability unit IIIw-5; woodland suitability group 4.

Chagrin Series

The Chagrin series consists of nearly level, deep, well-drained, loamy soils on flood plains throughout the county. These soils formed in recent alluvium.

In a representative profile of a Chagrin soil in a wooded area, the surface layer is very dark grayish-brown silt loam about 7 inches thick. The upper part of the subsoil, to a depth of 17 inches, is friable, yellowish-brown loam. The lower part of the subsoil, to a depth of 28 inches, is brown heavy loam. The underlying material, to a depth of 60 inches or more, is brown channery and very channery sandy loam.

Chagrin soils are subject to occasional flooding in spring. They have a deep rooting zone, moderate permeability, high available moisture capacity, and a moderately high content of organic matter. They are mostly medium acid in the rooting zone.

Some areas of Chagrin soils have been cleared for cultivation, but some of these are not presently farmed. The main crops are sweet corn, corn, wheat, and grass-legume meadow. Many areas are wooded.

Representative profile of Chagrin silt loam, in a wooded area in Richfield Township, T. 4 N., R. 12 W., in the Brushwood area of Furnace Run Metropolitan Park, 800 feet northeast of shelter house, and 100 feet east of Furnace Run, north of Shortcut Trail:

A1—0 to 7 inches, very dark grayish-brown (10YR 3/2) silt loam; dark grayish brown (10YR 4/2) when crushed; moderate, medium, granular structure; very friable; medium acid; clear, wavy boundary.

B1—7 to 17 inches, yellowish-brown (10YR 5/4) loam; weak, medium, subangular blocky structure; friable; patchy, dark grayish-brown (10YR 4/2) organic coatings on ped faces; many fine pores; medium acid; clear, smooth boundary.

B2—17 to 28 inches, brown (10YR 4/3) heavy loam; weak, medium, subangular blocky structure; firm; some fine pores; medium acid; clear, smooth boundary.

IIC1—28 to 40 inches, brown (10YR 4/3) channery sandy loam; many, medium, distinct, strong-brown (7.5YR 5/6) mottles; massive; friable; about 20 percent siltstone fragments; slightly acid; clear, smooth boundary.

IIC2—40 to 60 inches, brown (10YR 4/3) very channery sandy loam; massive; friable; neutral.

The A1, or the Ap, horizon is very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), and dark brown (10YR 4/3) and has weak, fine, granular to moderate, medium, granular structure. The texture of the B horizon is silt loam and loam, but thin, sandy loam layers are present in some places. The structure is weak, medium or coarse, subangular blocky. The horizon commonly has hues of 10YR and 7.5YR, value of 3 to 5, and chroma of 3 to 4, but 2-chroma mottles occur at a depth of 30 to 40 inches in some places. The weighted average clay content of the soil material between depths of 10 and 40 inches is about 18 to 22 percent. The reaction to a depth of 40 inches is medium acid to neutral.

The Chagrin soil in mapping unit Ck (Chagrin silt loam, alkaline) has a higher reaction throughout the profile and a higher silt content than the defined range for the Chagrin series, but this does not greatly affect its usefulness and behavior.

Chagrin soils are the well drained members of a drainage sequence that includes the moderately well drained Lobdell soils, the somewhat poorly drained Orrville soils, the poorly drained Holly soils, and the very poorly drained Sloan soils. They commonly are adjacent to those soils, but differ from them in lacking gray colors and gray mottles that are indicative of wetness.

Chagrin silt loam (Ch).—This nearly level soil commonly is in narrow strips on narrow flood plains, but it also is in broader areas near the confluence of Yellow Creek and Furnace Run with the Cuyahoga River. A profile of this soil is described as representative for the series. Included in mapping are small areas, particularly in the narrow bottoms, that are underlain by bedrock, by channery fragments, or by gravelly sand material below a depth of 2 to 3 feet. These areas generally have a lower available moisture capacity than this Chagrin soil.

Areas on the narrow flood plains are mainly wooded, but the broader areas are cultivated. Runoff is slow, and flooding is a hazard to farm and nonfarm uses of this soil. Capability unit IIw-5; woodland suitability group 1o1.

Chagrin silt loam, alkaline (Ck).—This nearly level soil is on the wide flood plains along the Cuyahoga River. It has a profile similar to the one described as representative for the Chagrin series, except that it is mildly alkaline throughout, has a higher content of silt, and is not commonly underlain by channery and gravelly material between depths of 40 and 60 inches. Although this soil differs in some respects from typical Chagrin soils, these differences and the extent of the soil are not enough to warrant a new series. Included in mapping are areas of slightly wetter soils and areas of moderately well drained soils.

Chagrin silt loam, alkaline, is among the least droughty of the well-drained soils in the county. Crops show signs of moisture deficiency in some years, but severe damage occurs only during extended droughts. This soil seldom requires lime for good plant growth. Most areas of this soil are used for crops.

Runoff is slow, and flooding is a hazard to farm and nonfarm uses of this soil. Capability unit IIw-5; woodland suitability group 1o1.

Chagrin-Urban land complex (Cm).—This mapping unit consists of nearly level soils on flood plains where 50 to 75 percent of the area of the original soil has been covered by fill. Fill areas typically consist of 3 to 5 feet of material overlying undisturbed Chagrin, alkaline, soils. The fill generally is mineral soil material, organic waste, bricks, and other debris from various sources. The composition of the fill and its suitability for plants vary from place to place.

This mapping unit is in areas that have been developed for uses other than farming. Flooding is a hazard; the hazard is particularly severe in low areas or areas that are not filled. Capability unit not assigned; woodland suitability group 1o1.

Chili Series

The Chili series consists of nearly level to steep, well-drained, loamy soils on outwash terraces and kames throughout the county (fig. 3). These soils formed in loamy outwash material overlying sand and gravel of Wisconsin age. Some Chili soils have a mantle of silt 8 to 24 inches thick.

In a representative profile of a Chili soil that has been cultivated, the plow layer is dark grayish-brown loam about 9 inches thick. The upper part of the subsoil, to a depth of 23 inches, is brown gravelly loam and gravelly heavy sandy loam. The lower part of the subsoil, to a depth of 42 inches, is brown very gravelly sandy loam and very gravelly loamy sand. The underlying material, to a depth of 60 inches or more, is loose, reddish-yellow and brown sand and gravelly coarse sand.

Figure 3.—Chili soils are in immediate foreground: the home in the foreground is on Chagrin silt loam; Rough broken land, silt and sand, is in the background.

Chili soils have moderately rapid permeability in the subsoil and rapid permeability in the gravelly and sandy underlying material. They warm up and dry early in spring. The rooting zone in these soils is moderately deep, and the available moisture capacity is medium to low. Chili soils tend to be droughty in periods of low rainfall.

About a third of the acreage of Chili soils is used for cultivated crops, another third is wooded, and the rest is in urban use. About a third of the cropland is not presently cultivated. The main crops are corn, wheat, and grass-legume meadow. Chili soils are a potential source of sand and gravel.

Representative profile of Chili loam, 2 to 6 percent slopes, in a formerly cultivated field, 800 feet west of West Reservoir (Portage Lakes), 1,800 feet north of State Route 619, 1,200 feet east of State Road, in SW¼ SE¼ sec. 1, Franklin Township; (sample No. ST-18 in table 10):

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) loam; weak, medium, granular structure; friable; many roots; about 10 percent coarse fragments; very strongly acid; abrupt, smooth boundary.

B1—9 to 14 inches, brown (7.5YR 5/4) gravelly loam; weak, medium, subangular blocky structure; friable; common roots; about 20 percent coarse fragments; very strongly acid; clear, smooth boundary.

B21t—14 to 23 inches, brown (7.5YR 4/4) gravelly heavy sandy loam; weak, medium, subangular blocky structure; friable; few roots; thin, continuous, brown (7.5YR 4/4) clay films on horizontal and vertical ped faces and bridging sand grains; 35 to 40 percent coarse fragments; very strongly acid; clear, smooth boundary.

IIB22t—23 to 30 inches, brown (7.5YR 4/4) very gravelly sandy loam; massive; friable; thin, patchy, brown (7.5YR 4/4) clay films bridging sand grains; few, fine, black (10YR 2/1) oxide stains; about 50 percent coarse fragments; very strongly acid; clear, smooth boundary.

IIB23t—30 to 42 inches, brown (7.5YR 4/4) very gravelly loamy sand; massive; very friable; thin, very patchy, brown (7.5YR 4/4) clay films bridging sand grains; about 60 percent coarse fragments; medium acid; clear, wavy boundary.

IIC1—42 to 50 inches, reddish-yellow (7.5YR 6/6) sand; loose; slightly acid; clear, smooth boundary.

IIC2—50 to 60 inches, brown (10YR 4/3) gravelly coarse sand; single grain; loose; 15 to 20 percent coarse fragments; slightly acid.

The solum ranges from 40 to 60 inches in thickness and includes a B2t horizon that commonly terminates at a depth of less than 42 inches. The Ap horizon, when moist, has a hue of 10YR, value of more than 3.5, and chroma of 2. Undisturbed areas have an A1 horizon that is 1 to 5 inches thick and very dark grayish brown (10YR 3/2) or very dark brown (10YR 2/2). The A2 horizon, where present, is as much as 5 inches thick and has value of 4 or 5 and chroma of 3 or 4. Texture of the A horizon is silt loam, loam, or sandy loam, and in places it is gravelly. The B horizon typically has a hue of 7.5YR, but the hue ranges from 10YR through 5YR. It has value of 4 or 5, and chroma ranges from 3 through 6. The Bt horizon ranges from 20 to 30 inches in thickness. The upper half of the Bt horizon is gravelly heavy sandy loam, loam, or sandy clay loam. Weighted average clay content of the upper 20 inches of the horizon ranges from 18 to 20 percent. The upper part of the horizon typically contains about 35 percent gravel, but the content ranges from 25 to 40 percent. The lower part of the Bt horizon typically contains more than 35 percent gravel, and the content ranges from 30 to 60 percent. The reaction of the Bt horizon ranges from very strongly acid to medium acid but is dominantly strongly acid. The C horizon is reddish yellow (7.5YR 6/6) or brown (10YR 4/3 or 5/3).

The Chili soils in mapping units CpA, CpB, and CpC have a silt mantle 8 to 24 inches thick. The texture of the A and B1 horizons and the upper part of the Bt horizon is silt loam. These Chili soils have a higher silt content and a lower gravel content in the upper part of the solum than the defined range for the series. As a result of the higher silt content, these soils have a higher available moisture capacity than the other Chili soils, but otherwise their use and behavior is not significantly different.

Chili soils are the well drained members of a drainage sequence that includes the moderately well drained Bogart soils, the somewhat poorly drained Jimtown soils, the poorly drained Damascus soils, and the very poorly drained Olmsted soils. They commonly are near the Conotton, Oshtemo, and Wheeling soils. Chili soils have a thicker B2 horizon and a higher clay content and less gravel in that horizon than the Conotton soils. They have a lower silt content and a higher gravel content than the Wheeling soils. Chili soils have a higher clay content, more gravel, and less sand in the B horizon than the Oshtemo soils.

Chili loam, 0 to 2 percent slopes (CnA).—This soil is on terraces in areas that are about 20 to 50 acres in size. Included in mapping are spots of the moderately well drained Bogart soils in low areas and some areas of gravelly soils.

Runoff is slow, and water enters the soil readily. Droughtiness is the major limitation to the use of this soil for crops. The limitations for most nonfarm uses are few. Capability unit IIs-1; woodland suitability group 2o1.

Chili loam, 2 to 6 percent slopes (CnB).—This undulating soil is on outwash terraces. Many areas are more than 50 acres in size. Slopes are commonly short and irregular. A profile of this soil is described as representative for the series.

Included in mapping are a few spots of soils that have slopes of 6 to 10 percent and small areas of soils that have a surface layer of silt loam, sandy loam, or gravelly loam. Also included are a few small areas of soils that have clay loam glacial till within a depth of 3 to 4 feet. These areas are in the village of Stow.

Runoff is slow to medium. Water movement into the soil and tilth are generally good. Erosion is a moderate hazard if the soil is cultivated. This soil is more droughty than many of the other well-drained soils in the county. Other than slope, it has few limitations to many nonfarm uses. Capability unit IIe-1; woodland suitability group 2o1.

Chili loam, 6 to 12 percent slopes (CnC).—This rolling soil is on terrace breaks and kames. Included in mapping are areas of eroded soils where the present plow layer is a mixture of the original surface layer and some of the subsoil.

Runoff is medium to rapid, the hazard of erosion is severe if the soil is cultivated and not protected. Droughtiness is a concern during dry periods in summer. Slope is a limitation to some nonfarm uses of this soil. Capability unit IIIe-1; woodland suitability group 2o1.

Chili gravelly loam, 6 to 12 percent slopes, moderately eroded (CoC2).—This rolling soil is on kames and terrace breaks. Its slopes are typically short and irregular in shape. The present surface layer is more than 20 percent gravel in most places. This soil has a lower available moisture capacity than areas of Chili loam or Chili silt loam that have the same slope.

Included in mapping are areas of soils where the surface layer is less than 20 percent gravel and a few areas

of soils where the surface layer is 50 percent or more gravel. Spots of Wooster silt loam in Green Township also are included.

Water moves into the surface layer of this soil rather readily. Runoff is mostly medium, and the hazard of erosion is severe if the soil is cultivated. During dry summers drought is a limitation to the use of this soil for farm crops. The gravelly texture causes rapid wearing of tillage implements. Slope is a dominant limitation to many nonfarm uses of this soil. Capability unit IIIe–1; woodland suitability group 2o1.

Chili gravelly loam, 12 to 18 percent slopes, moderately eroded (CoD2).—This soil is in hummocky areas and on terrace escarpments. In most areas the gravelly plow layer is a mixture of the original surface layer and some of the brown upper part of the subsoil. This soil has a lower available moisture capacity than Chili loam or Chili silt loam that has the same slope.

Included in mapping are small spots of Oshtemo soils, areas of soils that lack a gravelly surface layer, and small spots of Wooster soils.

This soil loses much water as runoff during heavy rains, and it is the most droughty Chili soil in the county. The hazard of erosion is very severe if the soil is cultivated. Slope is the dominant limitation to most nonfarm uses of this soil. Capability unit IVe–1; woodland suitability group 2r1.

Chili silt loam, 0 to 2 percent slopes (CpA).—This soil is on terraces, mainly in the southern part of the county. Most areas are less than 10 acres in size. This soil has a profile similar to the one described as representative for the series, except that the surface layer and upper part of the subsoil have a higher content of silt. Included in mapping are a few small spots of Wheeling soils.

Runoff is slow, and water moves into the soil readily. Droughtiness is the major limitation to the use of this soil for farming, but the soil is the least droughty of the Chili soils in the county. The surface layer has a greater tendency to crust than that of Chili loam or Chili gravelly loam. This soil has few limitations to most nonfarm uses. Capability units IIs–1; woodland suitability group 2o1.

Chili silt loam, 2 to 6 percent slopes (CpB).—This undulating soil is on terraces. Most areas are irregular in shape and less than 100 acres in size. This soil has a profile similar to the one described as representative for the series, except that the surface layer and upper part of the subsoil have a higher content of silt. The silt mantle is commonly 8 to 24 inches thick. Because this soil has a higher content of silt than Chili loam or Chili gravelly loam, it has a higher available moisture capacity.

Included in mapping are spots of steeper soils that are eroded. The present plow layer of these eroded soils is a mixture of the original surface layer and some of the upper part of the subsoil.

Runoff is medium, and erosion is a moderate hazard if the soil is cultivated. Other than slope, this soil has few limitations to many nonfarm uses. Capability unit IIe–2; woodland suitability group 2o1.

Chili silt loam, 6 to 12 percent slopes (CpC).—This soil is on terraces in areas that are irregular in shape and less than 10 acres in size. The plow layer is silt loam in most places. This soil has a profile similar to the one described as representative for the series, except that the surface layer and upper part of the subsoil have a higher content of silt.

Included in mapping are areas of moderately eroded soils that have been cleared. These moderately eroded soils are not so deep over sand and gravel as this Chili soil. Also included are a few spots of gravelly silt loam and loam.

Runoff is rapid, and the hazard of erosion is severe if the soil is cultivated. Slope is the dominant limitation to most nonfarm uses of this soil. Capability unit IIIe–1; woodland suitability group 2o1.

Chili-Urban land complex, undulating (CuB).—This mapping unit consists of areas where the original Chili soils have been largely destroyed or covered by grading and digging. Most areas are used for urban or industrial development. Borrow or fill areas make up 50 to 75 percent of the mapping unit, but the soils are undisturbed in undeveloped lots, in the back part of developed lots, and in small patches of woodland.

Fill areas typically consists of about 1 to 3 feet of fill material overlying Chili soils or inclusions of Bogart or Oshtemo soils. The fill is loamy material from the subsoil of Chili soils or, in some places, gravelly material. In the borrow areas, the subsoil of these soils or sand and gravel are exposed.

The surface layer of the disturbed soil commonly has a low organic-matter content and poor tilth. It is droughty, and seed germination is generally poor. The hazard of erosion is severe, particularly if the soil is bare of vegetation during construction. Bare areas produce large amounts of sediment and runoff. Other than slope, the mapping unit has few limitations for most nonfarm uses. Capability unit not assigned; woodland suitability group 2o1.

Chili-Urban land complex, rolling (CuC).—This mapping unit consists of areas where the original Chili soils have been largely destroyed or covered by grading and digging. Most areas are used for urban or industrial development. Borrow or fill areas make up 50 to 75 percent of the mapping unit, but the soils are undisturbed in undeveloped lots, in the back part of developed lots, and in small patches of woodland.

Fill areas typically consist of about 1 to 3 feet of fill material overlying undisturbed Chili soils or inclusions of Oshtemo soils. The fill is loamy material from the subsoil or gravelly material from the substratum of the Chili soils. In the borrow areas, the subsoil or substratum of these soils are exposed.

The surface layer of the disturbed soil commonly has a low organic-matter content and poor tilth. It is droughty, and seed germination is generally poor. The hazard of erosion is severe, particularly if the soil is bare of vegetation during construction. Through erosion large amounts of sediment are delivered to adjacent drainageways unless conservation practices are used during construction. Slope is the dominant limitation to many nonfarm uses of this mapping unit. Capability unit not assigned; woodland suitability group 2o1.

Chili-Wooster complex, 6 to 12 percent slopes, moderately eroded (CwC2).—This mapping unit consists of rolling soils on uplands. Slopes are typically short and irregular. Small, circular, dry depressions are common

in most areas. Chili soils generally make up about 40 to 50 percent of the acreage, Wooster soils about 20 to 30 percent, and Wheeling and Glenford soils most of the rest.

In most areas one-half or more of the original surface layer has been removed by erosion. The present surface layer is commonly loam but, in some places, is silt loam, sandy loam, or gravelly loam. It is a mixture of the original surface layer and material from the subsoil. Because of erosion, the soils absorb water less rapidly, more water is lost by runoff, and the plow layer is subject to the formation of crusts that may interfere with emergence of seedlings. Rock fragments in the soil range from few to many, and there are scattered large boulders.

Surface runoff is rapid on these soils. The fragipan in the Wooster soils is not so evident as that in other Wooster soils. The permeability of the Wooster soils is less than that of the Chili soils. The Chili soils in some areas are a potential source of sand and gravel, but the material commonly contains too much silt to be suitable for concrete. A severe hazard of erosion limits the use of these soils for farming. Slope is the dominant limitation of the soils to most nonfarm land uses. Capability unit IIIe-1; woodland suitability group 2o1.

Chili-Wooster complex, 12 to 18 percent slopes, moderately eroded (CwD2).—These soils are on uplands. Slopes are typically short and irregular. Small, circular, dry depressions are common in most areas. The Chili soils generally make up about 40 to 50 percent of the acreage, Wooster soils about 20 to 30 percent, and Wheeling and Glenford soils most of the rest.

The present surface layer in most areas is a mixture of yellowish-brown material from the subsoil and remnants of the original surface layer. It is commonly loam but, in some places, is silt loam, sandy loam, and gravelly loam. In a few included spots, the surface layer is mainly subsoil material. Rock fragments in the soil range from few to many, and there are scattered large boulders.

Runoff is rapid on these soils. The fragipan in the Wooster soils is not so evident as that in other Wooster soils. The permeability of the Wooster soils is less than that of the Chili soils. The Chili soils in some areas are a potential source of sand and gravel, but the material commonly contains too much silt to be suitable for concrete. A very severe hazard of erosion, slope, and droughtiness limit the use of these soils for cultivated crops. Moderately steep slopes are a limitation to most nonfarm uses of these soils. Capability unit IVe-1; woodland suitability group 2r1.

Chili-Wooster complex, 18 to 25 percent slopes, moderately eroded (CwE2).—These soils are along drainageways and are mainly wooded. The Chili soils generally make up about 40 to 50 percent of the acreage, Wooster soils about 20 to 30 percent, and Wheeling and Glenford soils most of the rest. Rock fragments in the soil range from few to many, and there are scattered large boulders. The surface layer is commonly loam but in some places is silt loam, sandy loam, and gravelly loam. Included in mapping are some areas that are very steep.

Surface runoff is rapid on these soils. The fragipan in the Wooster soils is not so evident as that in other Wooster soils. The permeability of the Wooster soils is less than that of the Chili soils. The Chili soils in some areas are a potential source of sand and gravel, but the material commonly contains too much silt to be suitable for concrete. The soils are generally too steep to be suited to cultivated crops, but they are suited to pasture and woodland. Steep slope is the dominant limitation to most nonfarm uses. Capability unit VIe-1; woodland suitability group 2r1.

Clay Pits and Quarries

Clay pits and quarries (Cx) consist of excavated areas produced by the surface mining of materials used to manufacture clay and sandstone products. Slopes are irregular and range from level to steep. Escarpments and ponds also are typical features.

Clay pits and quarries are most commonly associated with Loudonville and Dekalb soils and with Canfield soils that have a sandstone substratum.

Most pits range from 2 to 50 acres in size and have a high wall on one or more sides. The remaining soil material and debris vary widely in composition and commonly differ within short horizontal distances. Most of these areas are poorly suited to plant growth.

This land has a potential for development as wildlife habitat or recreation areas. It is not suited to farming or trees. Capability unit not assigned; woodland suitability group 4.

Conotton Series

The Conotton series consists of moderately steep to very steep, well-drained soils on kames and sides of drainageways. These soils formed in outwash gravel and sand of Wisconsin age.

In a representative profile of a Conotton soil in a pasture, the plow layer is brown gravelly sandy loam about 6 inches thick. The subsoil, to a depth of 21 inches, is brown gravelly and very gravelly sandy loam. Below this, to a depth of 32 inches, it is brown very gravelly loamy sand. Below a depth of 32 inches, and extending to a depth of 60 inches or more, is loose, yellowish-brown very gravelly sand.

Conotton soils have rapid permeability in the subsoil and in the gravelly and sandy underlying material. The rooting zone in these soils is mostly shallow and strongly acid. The available moisture capacity is very low.

Most of the acreage is wooded. A few areas have been cleared, but are not presently cultivated.

Representative profile of Conotton gravelly sandy loam in an area of Conotton-Oshtemo complex, 25 to 50 percent slopes, in a pasture in NE¼SW¼ sec. 13, Green Township, 100 feet south of Graybill Road and 1,100 feet west of Kreighbaum Road:

Ap—0 to 6 inches, brown (10YR 4/3) gravelly sandy loam; moderate, fine, granular structure; friable; 20 percent coarse fragments; strongly acid; abrupt, smooth boundary.

B21—6 to 13 inches, brown (7.5YR 4/4) gravelly sandy loam; single grain; very friable; thin very patchy clay films bridging sand grains and coating pebbles; 30 percent coarse fragments; strongly acid; clear, smooth boundary.

B22t—13 to 21 inches, brown (7.5YR 4/4) very gravelly sandy loam; single grain; very friable; thin patchy clay films coating pebbles and bridging pebbles and sand grains; 60 to 70 percent coarse fragments; strongly acid; clear, wavy boundary.

B31t—21 to 32 inches, brown (7.5YR 4/4) very gravelly loamy sand; single grain; loose; thin very patchy clay films on pebbles; 60 to 70 percent coarse fragments; strongly acid; clear, wavy boundary.

B32—32 to 60 inches, yellowish-brown (10YR 5/4) very gravelly sand; single grain; loose; 70 percent gravel; medium acid.

The solum ranges from 40 to 80 inches in thickness and includes a Bt horizon that generally extends to a depth of less than 40 inches. The Bt horizon ranges from 12 to 23 inches in thickness. In most places the Bt horizon is weakly developed.

Conotton soils commonly are near the Chili and Oshtemo soils. They are less clayey and more gravelly in the upper part of the B horizon than the Chili soils. Conotton soils have a more gravelly and less sandy B horizon than the Oshtemo soils.

Conotton-Oshtemo complex, 12 to 18 percent slopes (CyD).—The soils in this complex are in kamey areas, mainly in the southern part of the county. They have a surface layer of loam, sandy loam, and loamy sand. Conotton soils generally make up 50 to 60 percent of the complex, Oshtemo soils about 20 to 30 percent, and Chili soils the rest. The relative proportion of the soils, however, varies from place to place.

Although the soils in this complex can be used occasionally for crops, they are better suited to pasture. In several places they are a source of sand and gravel. The hazard of erosion is very severe if the soils are cultivated. Slope is a major limitation to most nonfarm uses of these soils. Capability unit VIe–1; woodland suitability group 3f1.

Conotton-Oshtemo complex, 18 to 25 percent slopes (CyE).—The soils in this complex are on kames in the southern part of the county and on many valley sides in the northern part of the county. Conotton soils generally make up 50 to 60 percent of the complex, Oshtemo soils about 20 to 30 percent, and Chili soils the rest. The relative proportion of the soils, however, varies from place to place. Included in mapping are small areas of moderately eroded soils.

The soils in this complex are susceptible to erosion and are difficult to till. The hazard of erosion is very severe if the soils are used for cultivated crops. Slope is the dominant limitation to both farm and nonfarm uses of these soils. Capability unit VIe–1; woodland suitability group 3f1.

Conotton-Oshtemo complex, 25 to 50 percent slopes (CyF).—The soils in this complex are on kames and the sides of valleys. Conotton soils generally make up 50 to 60 percent of the complex, Oshtemo soils about 20 to 30 percent, and Chili soils the rest. The relative proportion of the soils, however, varies from place to place. A profile of a Conotton soil in this complex is described as representative for the series. Included in mapping are areas of moderately eroded soils.

The soils in this complex are suited to native pasture and woodland, but most areas are wooded. Slope and droughtiness are limitations to the use of these soils. Capability unit VIIe–1; woodland suitability group 3f1.

Damascus Series

The Damascus series consists of deep, poorly drained, nearly level soils. These soils formed in sandy and loamy outwash material of Wisconsin age. They are on outwash terraces throughout the county.

In a representative profile of a Damascus soil in a wooded area, the surface layer is very dark gray and dark grayish-brown loam about 7 inches thick. The upper 2 inches of the surface layer is very dark gray because of the high content of organic matter. The subsurface layer is gray, mottled sandy loam that extends to a depth of 14 inches. In the upper part of the subsoil, the content of clay increases with increasing depth. The upper part of the subsoil, to a depth of 19 inches, is gray sandy loam. Below this, to a depth of 24 inches, it is gray heavy sandy loam, and, to a depth of 30 inches, it is gray sandy clay loam. The lower part of the subsoil is gray sandy loam that extends to a depth of 35 inches. Below this, the underlying material, to a depth of 60 inches or more, is dark grayish-brown sand.

Damascus soils have a high water table in winter, spring, and early in summer. Permeability is moderately rapid. The rooting zone in these soils is moderately deep if the soils are drained. Typically, they are strongly acid. The available moisture capacity is medium to low, but droughtiness is not a limitation, because the water table is near the root zone.

Most of the acreage is wooded. Some areas have been cleared of trees. Few areas are cultivated because most of them have not been artificially drained. Artificial drainage is beneficial to crops.

Representative profile of Damascus loam, in a wooded area within the city limits of Akron, T. 1 N., R. 10 W, 300 feet east of State Route 241 and 300 feet south of U.S. Highway 224:

A11—0 to 2 inches, very dark gray (10YR 3/1) loam; moderate, medium, granular structure; friable; many roots; strongly acid; abrupt, smooth boundary.

A12—2 to 7 inches, dark grayish-brown (2.5Y 4/2) loam; few, distinct, fine, yellowish-brown (10YR 5/8) mottles; weak, medium, subangular blocky structure; friable; common roots; strongly acid; abrupt, smooth boundary.

A2g—7 to 14 inches, gray (5Y 6/1) sandy loam; common, medium, distinct, yellowish-brown (10YR 5/8) mottles; weak, thick, platy structure; firm; few roots; strongly acid; clear, smooth boundary.

B1g—14 to 19 inches, gray (5Y 6/1) sandy loam; many, medium, distinct, yellowish-brown (10YR 5/8) mottles; weak, medium, subangular blocky structure; firm; few roots; strongly acid; clear, smooth boundary.

B21tg—19 to 24 inches, gray (5Y 6/1) heavy sandy loam; many, medium, distinct, yellowish-brown (10YR 5/8) mottles; weak, medium, subangular blocky structure; firm; thin, very patchy, gray (5Y 6/1) clay films in pores and bridging sand grains; 2 to 5 percent pebbles; strongly acid; clear, smooth boundary.

B22tg—24 to 30 inches, gray (5Y 6/1) sandy clay loam; many, coarse, prominent, strong-brown (7.5YR 5/8) mottles; weak, coarse, subangular blocky structure; firm; thin, patchy, gray (5Y 5/1) clay films bridging and coating sand grains; 2 to 5 percent pebbles; strongly acid; clear, smooth boundary.

B3tg—30 to 35 inches, gray (5Y 6/1) sandy loam; common, medium, distinct, yellowish-brown (10YR 5/8) mottles; massive; very friable; thin, very patchy, gray (5Y 5/1) clay films bridging and coating sand grains; strongly acid; clear, smooth boundary.

C—35 to 60 inches, dark grayish-brown (2.5Y 4/2) sand; single grain; loose; 2 to 5 percent pebbles; medium acid.

The solum ranges from 30 to 48 inches in thickness. The content of gravel in the solum and substratum ranges from 2 to 10 percent. In wooded areas the A1 horizon is 1 to 7

inches thick and is black (10YR 2/1) or very dark gray (10YR 3/1). The Ap horizon is dark grayish-brown (2.5Y 4/2) and gray (5Y 4/1).

The Bt horizon ranges from 16 to 28 inches in thickness. The matrix has hues of 2.5Y and 5Y, value of 4 to 6, and chroma of 2 or less. Mottles that have hues of 10YR and 7.5YR, value of 4 to 6, and chroma of 4 to 8 are common on many ped surfaces and cover 10 to 40 percent of the ped surfaces. Texture is typically sandy loam, sandy clay loam, or loam. The weighted average clay content of the upper 20 inches commonly is near 18 percent. The B2t horizon has a weak or moderate structure.

Damascus soils in this county have a lower content of gravel throughout the profile than Damascus soils in other survey areas. This does not significantly affect their use and management.

Damascus soils are the poorly drained members of a drainage sequence that includes the well drained Chili soils, the moderately well drained Bogart soils, the somewhat poorly drained Jimtown soils, and the very poorly drained Olmsted soils. They are commonly adjacent to Jimtown and Sebring soils. Damascus soils are similar in texture to Jimtown soils, but they are grayer in the B horizon and are more poorly drained. They have a less silty and more sandy B horizon than Sebring soils.

Damascus loam (Da).—This nearly level soil is on outwash terraces. Most areas range from 2 to 10 acres in size. Included in mapping are small spots of dark-colored, very poorly drained Olmsted soils. These spots are wetter than this Damascus soil and are in depressional areas. Also included are small areas of Sebring soils.

Runoff is slow to ponded, and wetness is a severe limitation to farming. A seasonally high water table is a limitation to most nonfarm uses of this soil. Capability unit IIIw-2; woodland suitability group 2w1.

Dekalb Series

The Dekalb series consists of moderately deep, well-drained, sloping to very steep soils. These soils formed in residuum weathered from coarse-grained, acid sandstone. They are on escarpments at the higher elevations throughout the county.

In a representative profile of a Dekalb soil in a wooded area, the surface layer is very dark grayish-brown sandy loam about 2 inches thick. The subsurface layer is yellowish-brown sandy loam about 3 inches thick. The subsoil is friable, dark yellowish-brown and yellowish-brown sandy loam that extends to a depth of 23 inches. Sandstone fragments are common throughout the surface layer and subsoil. The underlying material, to a depth of 36 inches, is yellowish-brown loamy sand and sand in fractured bedrock. Hard sandstone bedrock is at a depth of 36 inches.

Dekalb soils have rapid permeability above the sandstone bedrock. The rooting zone in these soils is moderately deep and very strongly acid, and available moisture capacity is low to very low. These are among the most droughty soils in the county.

Most of the acreage is wooded. A few areas are used for pasture.

Representative profile of Dekalb sandy loam, 25 to 70 percent slopes, in a wooded area in Twinsburg Township (T. 5 N., R. 10 W.), 1¾ miles east of Twinsburg, 2,000 feet east of Cannon Road, and 1,400 feet north of State Route 82:

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) sandy loam; weak, medium, crumb structure; friable; 10 percent sandstone fragments; strongly acid; abrupt, wavy boundary.

A2—2 to 5 inches, yellowish-brown (10YR 5/4) sandy loam; weak, thick, platy structure; friable; 10 percent sandstone fragments; very strongly acid; clear, smooth boundary.

B1—5 to 12 inches, dark yellowish-brown (10YR 4/4) and yellowish-brown (10YR 5/4) channery sandy loam; weak, medium, subangular blocky structure; friable; 15 to 20 percent sandstone fragments; very strongly acid; clear, smooth boundary.

B2—12 to 23 inches, dark yellowish-brown (10YR 4/4) channery sandy loam; moderate, medium, subangular blocky structure; friable; 30 to 40 percent sandstone fragments; very strongly acid; clear, irregular boundary.

C—23 to 36 inches, yellowish-brown (10YR 5/4) flaggy loamy sand and sand in fractures in sandstone bedrock; fractures are as much as 6 inches wide and are 2 to 3 feet apart; single grain; loose; very strongly acid; gradual, irregular boundary.

R—36 inches, sandstone bedrock.

The solum ranges from 20 to 30 inches in thickness. The A1 horizon is 2 to 5 inches thick and is very dark grayish brown (10YR 3/2), very dark brown (10YR 2/2), or black (10YR 2/1). The A2 horizon is missing in some places. The A horizon is sandy loam or channery sandy loam.

The B horizon ranges from 8 to 20 inches in thickness. It has hues of 10YR and 7.5YR, value of 4 or 5, and chroma of 4 or 5. Content of coarse fragments ranges from 5 to 20 percent in the upper part of the B horizon and from 20 to 50 percent in the lower part. Some of the fragments are stones. Fractured sandstone, which occurs within a depth of 20 to 30 inches, makes up about 90 percent of the mass. In some profiles the sandstone in the C horizon is soft and can be crushed between the fingers. Fractures are as much as 12 inches across, are 1 to 4 feet apart, and extend to a depth of 40 inches. The interstices are filled wiih sandy loam, loamy sand, or sand material.

Dekalb soils are on landscapes similar to those of the Loudonville and Berks soils. They are coarser textured and have a higher proportion of coarse fragments throughout the profile than Loudonville soils. Dekalb soils also lack the Bt horizon that is characteristic of Loudonville soils. They have a higher sand content and more sandstone fragments than Berks soils.

Dekalb sandy loam, 6 to 12 percent slopes (DkC).—This soil is in elongated areas on the upper part of hillsides. Slopes generally are short; only a few are more than 200 to 300 feet from top to bottom. Included in mapping are a few areas of eroded soils and small areas of Loudonville soils that are slightly deeper to bedrock than the Dekalb soils.

Runoff is medium to rapid, and erosion is a severe hazard if this soil is cultivated. Seeps or springs occur along the lower slopes in some areas. Slope and limited depth to bedrock are limitations to some nonfarm uses of this soil. Capability unit IIIe-1; woodland suitability group 3o1.

Dekalb sandy loam, 12 to 18 percent slopes (DkD).—This soil is in narrow strips on hillsides. Slopes generally are short, rarely over 200 to 300 feet in length. Included in mapping are areas of moderately eroded soils, areas of soils that have a stony sandy loam surface layer, and small spots of Loudonville soils. Sandstone ledges are present in some areas and may occupy up to 5 percent of a given area mapped as this Dekalb soil. Springs occur along the lower slopes in some areas.

Runoff is rapid, and erosion is a severe hazard if the soil is farmed. Slope and limited depth to bedrock are limitations to most nonfarm uses of this soil. Capability unit IVe-1; woodland suitability group 2r1.

Dekalb sandy loam, 18 to 25 percent slopes (DkE).—This soil is in narrow strips on hillsides. Slopes are generally short, rarely over 200 to 300 feet in length. Included in mapping are areas of moderately eroded soils and areas of soils that have a stony surface layer. Also included are a few sandstone ledges that make up as much as 10 percent of some areas mapped as this Dekalb soil. Springs occur along the lower part of slopes in some places.

Runoff is rapid, and the soil is too steep to be suited to cultivated crops. It is suited to pasture if erosion is controlled. Slope and limited depth to bedrock are limitations to most nonfarm uses of this soil. Capability unit VIe–1; woodland suitability group 2r1.

Dekalb sandy loam, 25 to 70 percent slopes (DkF).—This soil occurs as elongated escarpments. The escarpments are commonly not over 200 to 300 feet in width and are as much as several miles in length. The most extensive areas of this soil are in Boston and Twinsburg Townships. A profile of this soil is described as representative for the series. As much as 30 percent of some areas is sandstone ledges. Springs occur along the lower part of slopes in most places.

Included in mapping are areas of soils that have a stony surface layer and small areas of sandstone colluvium that are 1 or 2 acres in size. The colluvium is at the base of escarpments, and many large rocks are on the surface. It is deeper than this Dekalb soil.

Runoff is rapid. Because slopes are very steep, this soil is better suited to trees than to pasture, and most areas are wooded. Slope and limited depth to bedrock are major limitations to most nonfarm uses. Capability unit VIIe–1; woodland suitability group 2r1.

Ellsworth Series

The Ellsworth series consists of deep, moderately well drained, gently sloping to very steep soils. These soils formed in silty clay loam or clay loam glacial till of Wisconsin age. They are on uplands in the northern part of the county.

In a representative profile of an Ellsworth soil that has been cultivated, the plow layer is dark grayish-brown silt loam about 8 inches thick. The upper part of the subsoil, to a depth of 12 inches, is brown silty clay loam. Below this, to a depth of 24 inches, it is yellowish-brown silty clay loam. The lower part of the subsoil, to a depth of 31 inches, is dark-brown silty clay loam. The underlying material, to a depth of 60 inches or more, is dark grayish-brown and grayish-brown clay loam glacial till. This till material is compact and limy and contains pebbles and fragments of shale and siltstone.

Ellsworth soils have slow permeability in the subsoil and the underlying glacial till. They are saturated with free water for periods in winter and spring. They dry out slowly in spring. The rooting zone in these soils is mostly moderately deep and is slightly acid to very strongly acid. The available moisture capacity is medium.

Much of the acreage is wooded. Many cleared areas are not presently farmed (fig. 4). Where these soils are cultivated, the main crops are grass, legume, wheat, and corn.

Representative profile of Ellsworth silt loam, 2 to 6 percent slopes, in a cultivated field 1 mile southwest of Bath Center in Bath Township T. 3 N., R. 12 W., 4,000 feet south of Ira Road and 4,000 feet east of Hametown Road:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

B1—8 to 12 inches, brown (10YR 5/3) silty clay loam; weak, medium, subangular blocky structure; firm; common fine pores; slightly acid; clear, smooth boundary.

B21t—12 to 18 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, patchy, yellowish-brown (10YR 5/4) clay films on ped faces; a few pebbles; very strongly acid; clear, smooth boundary.

B22t—18 to 24 inches, yellowish-brown (10YR 5/4) heavy silty clay loam; common, medium, distinct, gray (5Y 5/1) mottles; moderate, medium, prismatic structure parting to moderate, medium, angular blocky structure; firm; medium, continuous, brown (10YR 5/3) clay films on vertical ped faces; thin very patchy clay films in ped interiors; 2 percent coarse fragments; medium acid; clear, smooth boundary.

B23t—24 to 31 inches, dark-brown (10YR 4/3) heavy silty clay loam; many, fine and medium, distinct, gray (5Y 5/1) mottles; moderate, coarse, prismatic structure parting to moderate, medium, angular blocky structure; firm; thin, continuous, grayish-brown (2.5Y 5/2) clay films, mainly on vertical ped faces; 2 percent coarse fragments; neutral; clear, wavy boundary.

C—31 to 60 inches, dark grayish-brown (10YR 4/2) and grayish-brown (2.5Y 5/2) clay loam; firm; 2 to 5 percent coarse fragments, mainly of siltstone and shale, and some pebbles; many, fine, light-gray (10YR 7/1) carbonate coatings; mildly alkaline and calcareous.

The thickness of the solum and the depth to carbonates range from 30 to 40 inches. In uncultivated areas the A1 horizon is very dark grayish brown (10YR 3/2) and 2 to 3 inches thick. The A2 horizon is brown (10YR 5/3) and 3 to 4 inches thick. The B1 horizon has a weak or moderate, medium, subangular blocky structure. Thin, very patchy clay films occur in some places. The matrix of the B2t horizon is yellowish brown (10YR 5/4), brown (10YR 4/3), and dark yellowish brown (10YR 4/4). The weighted average clay content of the upper 20 inches of this horizon ranges from 35 to 42 percent but is typically about 35 percent. Depth to the horizon ranges from 10 to 14 inches. Depth to gray (5Y 5/1 or 6/1) or grayish brown (10YR 5/2) mottling ranges from 12 to 22 inches. Clay films are dark yellowish brown (10YR 4/2), grayish brown (2.5Y 5/2), brown (10YR 5/3), dark brown (10YR 4/3), dark yellowish brown (10YR 4/4), and yellowish brown (10YR 5/4). The B1, B21t, and B22t horizons range from slightly acid to very strongly acid. The profile is less acid with increasing depth, and the lower part of the B2t horizon is commonly neutral. The calcareous C horizon has a calcium carbonate equivalent of 10 to 18 percent. The texture of the horizon is silty clay loam or clay loam.

Ellsworth soils are the moderately well drained members of a drainage sequence that includes the somewhat poorly drained Mahoning soils and the poorly drained Trumbull soils. They are commonly adjacent to Rittman, Mahoning, Geeburg, and Glenford soils. The Ellsworth soils have a higher clay content in the B and C horizons than Rittman soils, and they lack the Bx horizon of the Rittman soils. They are not so clayey as the Geesburg soils; they contain more coarse fragments than those soils and lack the varved or laminated C horizon. Ellsworth soils contain more clay and coarse fragments in the B and C horizons, but less silt, than the Glenford soils.

Ellsworth silt loam, 2 to 6 percent slopes (ElB).—This soil occupies knolls and side slopes parallel to drainageways. Most areas are more than 10 acres in size. A pro-

Figure 4.—Farm pond used for recreation, constructed on an Ellsworth silt loam.

file of this soil is described as representative of the series. Some areas of this soil are moderately eroded. These eroded areas have pebbles and coarse fragments on the surface, and they have a more sticky surface layer than uneroded areas. Included in mapping, particularly in less sloping areas where water from surrounding slopes accumulates, are small areas of the wetter, somewhat poorly drained Mahoning soils.

Runoff is medium, and the hazard of erosion is severe if the soil is cultivated. Seasonal wetness and slow permeability are major limitations to many nonfarm uses of this soil. Capability unit IIIe–4; woodland suitability group 3o1.

Ellsworth silt loam, 6 to 12 percent slopes (EIC).—This soil is mainly on side slopes parallel to drainageways. Included in mapping, particularly where there are long slopes broken by less sloping areas, are small spots of somewhat poorly drained Mahoning soils. Also included, along the Cuyahoga River Valley in Northampton and Boston Townships, are areas that are underlain by silty material below a depth of 40 inches.

Runoff is rapid, and the hazard of erosion is severe if the soil is cultivated. Slow permeability, seasonal wetness, and slope are limitations to most nonfarm uses of this soil. Capability unit IVe–3; woodland suitability group 3o1.

Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded (EIC2).—This soil is adjacent to drainageways and on moraines. It has a profile similar to the one described as representative for the series, but it is moderately eroded. The present plow layer is a mixture of the original surface layer and some of the more clayey, brown or yellowish-brown upper part of the subsoil. In a few spots the plow layer is mainly sticky, yellowish-brown subsoil material. If this soil is cultivated upslope and downslope, shallow rills and gullies 6 to 12 inches deep occur after heavy rains. After heavy rains in spring, shallow drainageways in this soil remain wet after adjoining areas have dried out.

The surface layer of this soil is sticky and cloddy and is difficult to till. Seed germination is commonly poor. Runoff is rapid, and the hazard of erosion is very severe if the soil is cultivated. Slow permeability and slope are limitations to many nonfarm uses of this soil. Capability unit IVe–3; woodland suitability group 3o1.

Ellsworth silt loam, 12 to 25 percent slopes, moderately eroded (EIE2).—This soil is on slopes along drainageways. Most of the cleared areas are moderately eroded. Areas that are wooded are slightly eroded or uneroded. The present surface layer in eroded areas is a sticky, brown or yellowish-brown mixture of the original

surface layer and some of the subsoil. In many areas siltstone fragments are on the surface.

Runoff is rapid to very rapid on this soil. Most areas are too steep and too eroded for cultivated crops, but they are suited to pasture. Slope and slow permeability are limitations to many nonfarm uses of this soil. Capability unit VIe–2; woodland suitability group 3r1.

Ellsworth silt loam, 25 to 50 percent slopes, moderately eroded (EIF2).—This soil is along drainageways that drain into the Cuyahoga River. It has a profile similar to the one described as representative for the series, but it is eroded and generally is more shallow over the underlying till. In many areas sandstone fragments are common on the surface. Included in mapping are areas where slopes are more than 50 percent and a few areas adjacent to streams where weathered siltstone and shale are exposed. Also included are areas of soils that have less clay in the subsoil and underlying material than is typical for the Ellsworth series.

Runoff is very rapid, and downslope slippage is a concern in areas not protected by permanent vegetation. This soil is generally better suited to trees or to native grass for permanent pasture than it is to improved pasture or to crops. Slope is the dominant limitation to nonfarm uses of this soil. Capability unit VIIe–1; woodland suitability group 3r1.

Ellsworth silt loam, sandstone substratum, 2 to 6 percent slopes (EsB).—This soil is in areas in the northern part of the county where sandstone bedrock is at a depth of 40 to 60 inches. It differs from the Ellsworth soil having the profile described as representative for the series because it formed in thinner glacial till. Included in mapping are areas of soils where the depth to bedrock is more than 60 inches.

A severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. Slow permeability and limited depth to bedrock are limitations to some nonfarm uses of this soil. Capability unit IIIe–4; woodland suitability group 3o1.

Ellsworth silt loam, sandstone substratum, 6 to 12 percent slopes (EsC).—This soil is in areas in the northern part of the county where sandstone bedrock is at a depth of 40 to 60 inches. It formed in thinner glacial till than the soil having the profile described as representative for the Ellsworth series. Included in mapping are areas of soils where the depth to bedrock is more than 60 inches.

Runoff is rapid, and the hazard of erosion is very severe if this soil is cultivated. Slope, slow permeability, and limited depth to bedrock are limitations to some nonfarm uses of the soil. Capability unit IVe–3; woodland suitability group 3o1.

Ellsworth-Urban land complex, undulating (EuB).—This mapping unit consists of areas where much of the original Ellsworth soils has been destroyed or covered by grading and digging. Slopes range from 2 to 6 percent. Most areas are used for residential or industrial development. Borrow or fill areas make up 50 to 75 percent of the mapping unit, but the soils are undisturbed in undeveloped lots, in the back part of developed lots, and in small wooded areas.

Fill areas typically consist of about 1 to 3 feet of fill material overlying undisturbed Ellsworth soils or areas of wetter, lower lying Mahoning soils. The fill is sticky material from the subsoil or sticky, limy material from the substratum of Ellsworth soils. In the borrow areas, the heavy silty clay loam substratum and subsoil of these soils are exposed.

The surface layer of the disturbed soil commonly has a low organic-matter content and poor tilth. It is soft and sticky when it is wet, but it cracks and becomes hard as it dries. Fill areas are poorly suited to lawns and landscaping unless topsoil is applied. The hazard of erosion is severe if the soil is bare of vegetation during construction. Runoff from disturbed areas is rapid, and gullying and sedimentation commonly occur. Slow permeability is the dominant limitation to many nonfarm uses of this complex. Capability unit not assigned; woodland suitability group 3o1.

Ellsworth-Urban land complex, rolling (EuC).—This mapping unit consists of areas where much of the original Ellsworth soils has been destroyed or covered by grading and digging. Slopes range from 6 to 18 percent. Most areas are used for urban or industrial development. Borrow or fill areas make up 50 to 75 percent of the mapping unit, but the soils are undisturbed in undeveloped lots, in the back part of developed lots, and in small wooded areas.

Fill areas typically consist of about 1 to 3 feet of fill material overlying undisturbed Ellsworth soils. The fill is sticky material from the subsoil or sticky, limy material from the substratum of Ellsworth soils. In the borrow areas, the heavy silty clay loam substratum and subsoil of these soils are exposed.

The surface layer of the disturbed soil commonly has a low organic-matter content and poor tilth. It is soft and sticky when it is wet, but it cracks and becomes hard as it dries. The hazard of erosion is severe if the soil is bare of vegetation during construction. Runoff from disturbed areas is very rapid, and gullying and sedimentation commonly occur. Slope and slow permeability are limitations to many nonfarm uses of this complex. Capability unit not assigned; woodland suitability group 3o1.

Fitchville Series

The Fitchville series consists of nearly level to gently sloping, somewhat poorly drained soils. These soils formed in silty sediment that settled in glacial lakes of Wisconsin age. They are on stream terraces and in glacial lakebeds throughout the county.

In a representative profile of a Fitchville soil that has been cultivated, the plow layer is dark grayish-brown silt loam about 7 inches thick. The upper part of the subsoil, to a depth of 10 inches, is yellowish-brown silt loam. Below this, the subsoil is yellowish-brown silty clay loam to a depth of 18 inches and dark yellowish-brown silty clay loam to a depth of 29 inches. The lower part of the subsoil, extending to a depth of 40 inches, is brown silt loam. Below the subsoil, the underlying material, to a depth of 60 inches or more, is stratified, friable silt loam.

Fitchville soils have moderately slow permeability. They have a water table near the surface late in winter and in spring. The rooting zone in these soils is moderately deep in spring and generally is deep in summer. It generally is deep in areas that are artificially drained. The rooting zone is very strongly acid, and the available moisture capacity is medium to high. Artificial

drainage is beneficial to crops. These soils are soft and compressible if wet.

A few areas of Fitchville soils are cultivated. The main crops are corn, wheat, and grass-legume meadow. Many areas have been farmed but are not presently farmed. Some areas are wooded.

Representative profile of Fitchville silt loam, 2 to 6 percent slopes, in a cultivated field in Twinsburg Township, T. 5 N., R. 10 W., 1,600 feet west of State Route 91 and 600 feet east of Tinkers Creek along East Ohio Gas Company pipeline:

Ap—0 to 7 inches, dark grayish-brown (2.5Y 4/2) silt loam; moderate, medium, granular structure; friable; many roots; slightly acid; abrupt, smooth boundary.

B1—7 to 10 inches, yellowish-brown (10YR 5/4) silt loam; many, fine, distinct, light brownish-gray (2.5Y 6/2) mottles and common, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; friable; many fine pores; many light brownish-gray (2.5Y 6/2) ped coatings; very strongly acid; clear, smooth boundary.

B21tg—10 to 18 inches, yellowish-brown (10YR 5/6) silty clay loam; many, medium, distinct, gray (5Y 5/1) mottles; moderate, coarse, subangular blocky structure; firm; thin, patchy, gray (5Y 5/1) clay films on horizontal and vertical ped faces; common roots along vertical ped faces; very strongly acid; clear, smooth boundary.

B22tg—18 to 29 inches, dark yellowish-brown (10YR 4/4) silty clay loam; common, medium, distinct, gray (5Y 5/1) mottles; moderate, coarse, prismatic structure parting to weak, coarse, subangular blocky structure; firm; medium, patchy, gray (5Y 5/1) clay films on vertical ped faces and thin, very patchy, gray (5Y 5/1) clay films on horizontal ped faces and in pores; a few black (10YR 2/1) oxide stains in ped interiors; few roots along horizontal ped faces; strongly acid; clear, irregular boundary.

B3g—29 to 40 inches, brown (10YR 4/3) silt loam; common, medium, distinct, gray (5Y 5/1) and yellowish-brown (10YR 5/6) mottles; weak, coarse, prismatic structure; friable; thin, very patchy, gray (5Y 5/1) clay films along vertical ped faces and in pores; medium acid; gradual, smooth boundary.

C—40 to 60 inches, brown (10YR 4/3) silt loam; common, medium, distinct, gray (5Y 5/1) and yellowish-brown (10YR 5/6-5/8) mottles; massive to weak, thick, platy structure; friable; neutral.

The solum ranges from 30 to 42 inches in thickness. In uncultivated areas a very dark gray (10YR 3/1) A1 horizon that is 2 to 4 inches thick and a light brownish-gray (2.5Y 6/2) A2 horizon that is 3 to 4 inches thick are present. The Ap horizon is dark grayish brown (10YR 4/2 or 2.5Y 4/2). The B1 horizon is 3 to 5 inches thick and has light brownish-gray (2.5Y 6/2) and grayish-brown (2.5Y 5/2) coats on peds. The Bt horizon ranges from 18 to 30 inches in thickness and is at a depth of 10 to 16 inches. In the B horizon the matrix has hues of 10YR and 2.5Y, value of 4 or 5, and chroma ranging from 4 to 6. Ped surfaces dominantly have chroma of 2 or less. Texture of this horizon is silt loam to silty clay loam, the weighted average clay content ranges from 22 to 35 percent, and the weighted average content of sand coarser than very fine sand is less than 15 percent. Thin strata of loam or clay loam occur in the Bt horizon in some places. The upper part of the B horizon is very strongly acid to strongly acid, and the lower part is medium acid to slightly acid. Because of stratification, the ratio of clay in the B horizon to clay in the A horizon is less than 1.2 in some Fitchville soils. A thin, very firm, slightly brittle layer occurs in the lower part of the Bt horizon in some places.

Fitchville soils are the somewhat poorly drained members of a drainage sequence that includes the moderately well drained Glenford soils, the poorly drained Sebring soils, and the very poorly drained Luray soils. They are commonly adjacent to Glenford, Sebring, Caneadea, and Mahoning soils. Fitchville soils have a less clayey B horizon than Caneadea and Mahoning soils, and they contain less sand than Mahoning soils.

Fitchville silt loam, 0 to 2 percent slopes (FcA).—Areas of this soil are irregular in shape and are seldom over 10 acres in size. Included in mapping, particularly in shallow drainageways and depressions, are small spots of poorly drained Sebring soils. Also included are spots of soils that are underlain by fine sandy loam or loam below a depth of 20 inches.

Runoff is slow, and water ponds in some areas during periods of heavy rainfall. Wetness is a moderate limitation to cultivated crops. This soil is subject to surface crusting. Seasonal wetness and moderately slow permeability are limitations to many nonfarm uses of this soil. Capability unit IIw-2; woodland suitability group 2w2.

Fitchville silt loam, 2 to 6 percent slopes (FcB).—This soil is on terraces and alluvial fans. Most areas are 5 to 20 acres in size. A profile of this soil is described as representative for the series. Included in mapping, particularly on the more sloping knolls, are small spots of moderately well drained Glenford soils and spots of soils that are underlain by fine sandy loam or loam below a depth of 20 inches.

Some areas of this Fitchville soil, in the Cuyahoga River Valley in the vicinity of Everett, have a very dark gray surface layer. The Fitchville soil in these areas has a slightly higher organic-matter content than is typical for the series.

Runoff is medium to rapid. The hazard of erosion is moderate, but seasonal wetness is the dominant limitation to farming. Seasonal wetness and slow permeability are limitations to many nonfarm uses of this soil. Capability unit IIw-2; woodland suitability group 2w2.

Fitchville-Urban land complex (Fn).—This mapping unit consists of nearly level areas where the original Fitchville soils have been disturbed, removed, or covered by grading and digging. Most areas are used for urban or industrial development. Borrow or fill areas make up 50 to 75 percent of the mapping unit, but the soils are undisturbed in undeveloped lots, in the back part of developed lots, and in small wooded areas.

Fill areas typically consist of about 1 to 3 feet of fill material overlying undisturbed Fitchville soils or included areas of wetter, lower lying Sebring soils. The fill is silty material from the subsoil or limy, silty material from the substratum of Fitchville soils. In the borrow areas, the substratum or subsoil of these soils is exposed.

The surface layer of the disturbed soil commonly has a low organic-matter content and poor tilth. It tends to crust and seal over after periods of rainfall, and the range of moisture content suitable for grading is narrow.

Seasonal wetness is a limitation, particularly where grading has made depressional or bowl-shaped areas. Disturbed areas are highly susceptible to erosion. Capability unit not assigned; woodland suitability group 2w2.

Frenchtown Series

The Frenchtown series consists of nearly level, poorly drained soils that have a fragipan. These soils formed in weathered loam glacial till of Wisconsin age. They are on uplands in the southern part of the county.

In a representative profile of a Frenchtown soil that has been cultivated, the plow layer is dark-gray silt loam about 10 inches thick. Beneath the plow layer, to a depth of 17 inches, is a layer of gray loam. The upper part of the subsoil, to a depth of 32 inches, is firm, gray clay loam. The lower part of the subsoil, between depths of 32 and 62 inches, is a dense and compact fragipan that is mainly brown loam. Below the subsoil, between depths of 62 and 86 inches or more, the underlying material is firm, neutral, brown loam glacial till that contains a few pebbles and fragments of sandstone and siltstone.

Frenchtown soils have slow permeability. They are in low-lying positions on the landscape. A water table is within 4 feet of the surface much of the year; it generally is near the surface in spring. These soils dry and warm slowly in spring unless they are artificially drained. The rooting zone is moderately deep when the water table is low in summer. It is strongly acid. Few roots penetrate the fragipan, but some extend downward along vertical cracks. The available moisture capacity is medium.

Most areas of Frenchtown soils are wooded.

Representative profile of Frenchtown silt loam, in a cultivated field within the city limits of Barberton, 2,500 feet east of State Route 619 and 2,900 feet south of Robinson Avenue; (sample No. ST-15 in table 10):

Ap—0 to 10 inches, dark-gray (10YR 4/1) silt loam; moderate, medium, granular structure; friable; neutral; abrupt, smooth boundary.

A&B—10 to 17 inches, gray (5Y 6/1) loam; common, medium, distinct, yellowish-brown (10YR 5/8) mottles; weak, thick, platy structure; firm; gray (5Y 6/1) ped faces; thin, patchy, gray (5Y 5/1) clay films in pores in ped interiors; slightly acid; clear, wavy boundary.

B21tg—17 to 23 inches, gray (5Y 6/1) clay loam; many, medium, distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium, prismatic structure; firm; thin, patchy, gray (5Y 5/1) clay films on vertical ped faces and in ped interiors; very strongly acid; gradual, wavy boundary.

B22tg—23 to 32 inches, gray (5Y 5/1) clay loam; many, fine and medium, distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium, prismatic structure; firm; medium, continuous, dark-gray (5Y 4/1) clay films on vertical ped faces and in ped interiors; very strongly acid; clear, wavy boundary.

Bx1—32 to 38 inches, grayish-brown (2.5Y 5/2) and yellowish-brown (10YR 5/8) clay loam; weak, coarse, prismatic structure; very firm, some brittleness; thin, patchy, dark-gray (10YR 4/1) clay films on vertical ped faces; about 1 percent coarse fragments; very strongly acid; gradual, wavy boundary.

Bx2—38 to 51 inches, brown (10YR 4/3) loam; common, distinct, gray (10YR 5/1) mottles; weak, coarse, prismatic structure; very firm, brittle; thin, patchy, dark-gray (10YR 4/1) clay films mainly on vertical ped faces; less than 5 percent coarse fragments; very strongly acid; gradual, wavy boundary.

Bx3—51 to 62 inches, brown (10YR 4/3) loam; common, medium, distinct, gray (10YR 5/1) mottles; moderate, thick, platy structure; very firm; thin, patchy, dark-gray (10YR 4/1) clay films mainly on horizontal faces; a few black (10YR 2/1) oxide stains; about 2 percent coarse fragments; very strongly acid; clear, wavy boundary.

C1—62 to 71 inches, brown (10YR 4/3) loam; weak, thick, platy structure; firm; thin, very patchy, dark-gray (10YR 4/1) clay films in vertical fractures; common, medium, black (10YR 2/1) oxide stains between plates; about 2 percent coarse fragments; medium acid; clear, wavy boundary.

C2—71 to 86 inches, brown (10YR 4/3) loam; weak, thick, platy structure; firm; common, medium, black (10YR 2/1 oxide stains between plates; about 2 percent coarse fragments; neutral.

The solum ranges from 50 to 70 inches in thickness. In uncultivated areas the A1 horizon is black (10YR 2/1) or very dark gray (10YR 3/1) and is 3 to 5 inches thick. It is underlain by a 4- to 6-inch A2 horizon. The A2 horizon has a chroma of 1 or 2; contains common, dark oxide concretions; and generally has mottles of higher chroma. In some places a silt mantle as much as 20 inches thick is present.

The horizons above the fragipan dominantly have a chroma of 2 or less. They are typically clay loam, silty clay loam, loam, or silt loam and have a clay content ranging from 25 to 34 percent.

Depth to the fragipan ranges from 23 to 32 inches but is commonly at the deeper end of the range. Ped interiors have hues of 10YR and 2.5Y, value of 4 or 5, and typically, a chroma dominantly of 3 but ranging from 2 to 4. Polygon and prism faces have continuous clay films and silt coatings. The films have a hue of 10YR, 2.5Y, 5Y, or neutral (N), values of 4 to 6 and chromas of 0 to 2. The texture of the fragipan is typically loam but ranges to light clay loam. The solum typically is strongly acid to very strongly acid but, in some places, is medium acid in the lower part of the B horizon.

Frenchtown soils are the poorly drained members of a drainage sequence that includes the well drained Wooster soils, the moderately well drained Canfield soils, and the somewhat poorly drained Ravenna soils. They are commonly adjacent to their drainage associates and to poorly drained Sebring soils, which occur in similar positions on the landscape. Frenchtown soils differ from Sebring soils in having a fragipan and in having formed in glacial till.

Frenchtown silt loam (Fr).—This nearly level soil is in irregularly shaped, elongated areas ranging from 2 to 10 acres in size. Runoff from surrounding higher soils tends to accumulate on this soil, and wetness is a severe limitation for cultivated crops. Excessive wetness and slow permeability are limitations to most nonfarm uses of this soil. Capability unit IIIw-2; woodland suitability group 2w1.

Geeburg Series

The Geeburg series consists of gently sloping to moderately steep, moderately well drained soils. These soils formed in clayey sediment deposited in lakes of Wisconsin age. They are on dissected terraces, mainly in the northern part of the county.

In a representative profile of a Geeburg soil in a wooded area, the surface layer is very dark grayish-brown silt loam about 3 inches thick. The subsurface layer is brown heavy silt loam 4 inches thick. The upper part of the subsoil, to a depth of 10 inches, is brown heavy silty clay loam. Below this, the subsoil is yellowish-brown and dark yellowish-brown silty clay that extends to a depth of 33 inches. The underlying material, to a depth of 60 inches, is brown, stratified silty clay.

Geeburg soils have slow permeability in the subsoil and in the clayey underlying material. They have a perched water table during wet periods in winter and in spring. The rooting zone in these soils is moderately deep, and the available moisture capacity is medium. These soils are strongly acid or very strongly acid to a depth of 10 inches and are medium acid to moderately alkaline below this depth. Geeburg soils shrink as they dry and swell as they become wet. They are subject to slippage on slopes.

Most areas of Geeburg soils are wooded. Some areas have been cleared, but few of these are cultivated.

Representive profile of Geeburg silt loam, 6 to 12 percent slopes, moderately eroded, southwest in Boston Township T. 4 N., R. 11 W., three-tenths mile east of Kendall Lake and 150 feet southwest of Quick Road:

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; friable; strongly acid; abrupt, smooth boundary.

A2—3 to 7 inches, brown (10YR 5/3) heavy silt loam; weak, medium, platy structure; friable; dark yellowish-brown (10YR 3/4) krotovinas; very strongly acid; clear, smooth boundary.

B1—7 to 10 inches, brown (10YR 5/3) heavy silty clay loam; moderate, medium, subangular blocky structure; firm; light yellowish-brown (10YR 6/4) silt coatings on ped faces; strongly acid; clear, wavy boundary.

B21t—10 to 16 inches, yellowish-brown (10YR 5/4) silty clay; strong, medium, angular blocky structure; firm; thin, very patchy, brown (10YR 5/3) clay films on peds; medium acid; clear, smooth boundary.

B22t—16 to 24 inches, yellowish-brown (10YR 5/4) silty clay with common, fine, distinct, light brownish-gray (2.5Y 6/2) mottles; strong, coarse, angular blocky structure; firm; thin, patchy, brown (10YR 4/3) clay films on peds; neutral; clear, smooth boundary.

B3t—24 to 33 inches, dark yellowish-brown (10YR 4/4) silty clay; few, fine, distinct, grayish-brown (2.5Y 5/2) mottles; strong, coarse, subangular blocky structure parting to moderate, medium, angular blocky structure; firm; thin, patchy, dark-brown clay films on peds; moderately alkaline; clear, smooth boundary.

C—33 to 60 inches, brown (10YR 4/3) silty clay and strata of clay and silt; massive; firm; pale-brown (10YR 6/3) lime accumulation on vertical surfaces; moderately alkaline and calcareous.

Matrix of the B1 horizon is yellowish brown (10YR 5/4) and brown (10YR 5/3). Matrix of the B2t horizon matrix is yellowish brown (10YR 5/4 and 5/6), brown (10YR 4/3), and dark yellowish brown (10YR 4/4). Depth to the Bt horizon ranges from 10 to 14 inches. Mottles of 2 chroma or less are present within the upper 10 inches of the horizon. Clay content ranges from 46 to 60 percent. Depth to calcareous material ranges from 30 to 40 inches.

The Geeburg soils in this county differ from Geeburg soils in other survey areas by having a stratified C horizon. This sight difference does not greatly affect the use or management of these soils.

Geeburg soils are the moderately well drained members of a drainage sequence that includes the somewhat poorly drained Caneadea soils, the poorly drained Canadice soils, and the very poorly drained Lorain soils. They are commonly adjacent to Ellsworth and Caneadea soils. Geeburg soils contain more clay in the B horizon than Ellsworth soils and less gray colors than Caneadea soils.

Geeburg silt loam, 2 to 6 percent slopes (GbB).—This soil is on elongated ridges between entrenched tributaries of the Cuyahoga River. Most areas of this soil are 2 to 10 acres in size. Included in mapping are areas of moderately eroded soils and small spots of Ellsworth and Glenford soils.

Runoff is medium, and erosion is a severe hazard if the soil is cultivated. Slow permeability is the major limitation of this soil for many nonfarm uses. Capability unit IIIe-4; woodland suitability group 2c1.

Geeburg silt loam, 6 to 12 percent slopes, moderately eroded (GbC2).—This soil is on hillsides in the Cuyahoga River Valley. In most areas as much as 6 inches of the original surface layer has been removed through erosion and the present surface layer is mainly brown or yellowish-brown subsoil material. An uneroded profile of this soil is described as representative for the series. Included in mapping are small spots of Ellsworth and Glenford soils and areas of soils that are not eroded.

Runoff is rapid, and erosion is a very severe hazard if this soil is used for cultivated crops. Slow permeability, slope, and instability are limitations to many nonfarm uses of this soil. Capability unit IVe-3; woodland suitability group 2c1.

Geeburg silt loam, 12 to 18 percent slopes, moderately eroded (GbD2).—This soil is on hillsides along drainageways. Most areas are elongated and generally are less than 10 acres in size. In most areas that have been cleared and cultivated, erosion has removed some of the original plow layer and the present surface layer is a mixture of the original surface layer and some of the clayey subsoil. Included in mapping are wooded areas of uneroded soils.

Runoff is very rapid, and the hazard of erosion is severe unless vegetative cover is maintained. This soil is droughty and is not so well suited to hay and pasture crops as less eroded Geeburg soils. Slope, slow permeability, and instability are limitations to many nonfarm uses of this soil. Capability unit VIe-2; woodland suitability group 2c1.

Glenford Series

The Glenford series consists of deep, moderately well drained, nearly level to moderately steep soils. These soils formed in stratified silty material. They are on terraces throughout the county.

In a representative profile of a Glenford soil that has been cultivated, the surface layer is dark grayish-brown silt loam about 9 inches thick. The subsurface layer is light yellowish-brown silt loam about 3 inches thick. Below this is a layer of yellowish-brown silt loam that extends to a depth of 16 inches. The subsoil is dark yellowish-brown silt loam that extends to a depth of 40 inches. Between depths of 40 and 60 inches, the underlying material is friable, brown silt loam. Below this it is friable, yellowish-brown silt.

Glenford soils have moderately slow permeability in the subsoil and in the underlying material. They are saturated with water to within 2 feet of the surface during periods of high rainfall in winter and in spring. The rooting zone in these soils is deep in summer, and it is strongly acid in the upper 24 inches. The available moisture capacity is high. Glenford soils are soft and compressible when saturated. They are unstable on slopes.

A few areas of Glenford soils are used for corn, wheat, or hay crops or for pasture. Most areas formerly cleared for farming are reverting to bush and trees.

Representative profile of Glenford silt loam, 2 to 6 percent slopes, in Peninsula Village, T. 4 N., R. 11 W., 150 feet north of Major Road and 900 feet west of the intersection of Major Road and Riverview Road; (sample No. ST-27 in table 10):

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable; slightly acid; abrupt, smooth boundary.

A2—9 to 12 inches, light yellowish-brown (10YR 6/4) silt loam; weak, medium, platy structure; firm; slightly acid; clear, smooth boundary.

B&A—12 to 16 inches, yellowish-brown (10YR 5/4) silt loam; moderate, medium, subangular blocky structure; firm; many medium pores; peds coated with light yellowish-

brown (10YR 6/4); thin very patchy clay films in pores; strongly acid; clear, wavy, boundary.

B21t—16 to 21 inches, dark yellowish-brown (10YR 4/4) silt loam; common, fine, distinct, light brownish-gray (2.5Y 6/2) mottles; moderate, medium, subangular blocky structure; firm to very firm; continuous pale-brown (10YR 6/3) silt coatings, 0.5 to 1 millimeter thick, on ped faces and in ped interiors; thin, patchy, dark yellowish-brown (10YR 5/4) clay films in pores; very strongly acid; clear, smooth boundary.

B22t—21 to 29 inches, dark yellowish-brown (10YR 4/4) silt loam; many, medium, distinct, light brownish-gray (2.5Y 6/2) mottles; weak, coarse, prismatic structure (prisms 2 to 4 inches across) parting to weak, coarse, subangular blocky structure; very firm; thin, patchy, grayish-brown (2.5Y 5/2) clay films in pores and on ped faces; thin, patchy, pale-brown (10YR 6/3) silt coatings on ped faces; strongly acid; clear, smooth boundary.

B3t—29 to 40 inches, dark yellowish-brown (10YR 4/4) heavy silt loam; common, fine, distinct, gray (5Y 5/1) mottles; weak, very coarse, prismatic structure (prisms 5 to 6 inches across); firm; thin, patchy, light brownish-gray (2.5Y 6/2) clay films on ped faces and in some pores; yellowish-brown (10YR 5/6) under the clay films on some peds; slightly acid; clear, wavy boundary.

C1—40 to 60 inches, brown (10YR 4/3) silt loam; common, fine and medium, distinct, gray (5Y 5/1) mottles; massive, but stratified layers have weak, medium, platy structure; friable; neutral; clear, wavy boundary.

C2—60 to 80 inches, yellowish-brown (10YR 5/6) silt; common, distinct, medium-gray (N 6/0) mottles; massive, but weakly laminated; friable; neutral.

In cultivated areas the Ap horizon is dark grayish brown (10YR 4/2) or dark brown (10YR 4/3). The Bt horizon ranges from 16 to 32 inches in thickness and is at a depth of 9 to 16 inches. The matrix has a hue of 10YR, value of 4 or 5, and chroma of 3 or 4. Mottles that have a chroma of 2 or less occur within the upper 10 inches of the horizon. The texture ranges from heavy silt loam to silty clay loam, and the average clay content is less than 35 percent. The B2t horizon ranges from very strongly acid to medium acid, and the B3t horizon is medium acid to slightly acid. The solum ranges from 30 to 42 inches in thickness. A thin, very firm, slightly brittle layer occurs in the lower part of the Bt horizon in some places.

Glenford soils are the moderately well drained members of a drainage sequence that includes the somewhat poorly drained Fitchville soils, the poorly drained Sebring soils, and the very poorly drained Luray soils. They are commonly adjacent to Fitchville, Geeburg, and Ellsworth soils. The Glenford soils are similar in texture to Fitchville soils, but they are less gray in the B horizon. They have a less clayey B horizon than Geeburg and Ellsworth soils.

Glenford silt loam, 0 to 2 percent slopes (GfA).—This soil is on terraces in areas that are generally less than 5 acres in size. It has a profile similar to that described as representative for the series, except that the substratum is gravelly and sandy below a depth of 40 inches in most areas.

Runoff is slow, and the surface layer is susceptible to crusting, but otherwise this soil has few limitations to farming. Moderately slow permeability is a limitation to some nonfarm uses of this soil. Capability unit I–1; woodland suitability group 1o1.

Glenford silt loam, 2 to 6 percent slopes (GfB).—This soil is on terraces throughout the county and in areas between entrenched tributaries of the Cuyahoga River. Some areas are elongated, and most areas are 2 to 10 acres in size. A profile of this soil is described as representative for the series.

Included in mapping, particularly in less sloping areas where water from surrounding slopes has accumulated, are small spots of somewhat poorly drained Fitchville soils. Also included are small areas of Ellsworth and Geeburg soils near the Cuyahoga River Valley.

Runoff is medium to rapid, and erosion is a moderate hazard if this soil is used for cultivated crops. Moderately slow permeability is a limitation to some nonfarm uses of this soil. Capability unit IIe–2; woodland suitability group 1o1.

Glenford silt loam, 6 to 12 percent slopes, moderately eroded (GfC2).—This soil is in areas along drainageways. Most areas are elongated and are 5 to 10 acres in size. Its profile differs from the one described as representative for the series because the soil is moderately eroded. In most areas as much as 50 percent of the original surface layer has been removed through erosion. The present plow layer is a mixture of the original surface layer and some of the yellowish-brown subsoil. Erosion has reduced the organic-matter content, and the surface layer crusts easily.

Included in mapping are a few areas of an uneroded Glenford silt loam having slopes of 6 to 12 percent, small areas of Ellsworth and Geeburg soils, and areas of a Glenford silt loam that has layers of clayey material below the subsoil.

Runoff is rapid, and erosion is a severe hazard if this soil is used for cultivated crops. Slow permeability and slope are limitations to many nonfarm uses of this soil. Capability unit IIIe–2; woodland suitability group 1o1.

Glenford silt loam, 12 to 18 percent slopes, moderately eroded (GfD2).—This soil is on hillsides, mainly along drainageways. Much of the original surface layer has been removed through erosion. Erosion has reduced the organic-matter content, and the surface crusts easily.

Included in mapping are a few areas of an uneroded Glenford silt loam that has slopes of 12 to 18 percent, and a few areas that have gullies as much as several feet deep.

Runoff is rapid, and erosion is a very severe hazard if this soil is used for cultivated crops. Slope and slow permeability are limitations to most nonfarm uses of this soil. Capability unit IVe–1; woodland suitability group 1r1.

Glenford-Urban land complex, undulating (GoB).—This mapping unit consists of areas where much of the original Glenford soils has been destroyed or covered by grading and digging. Most areas are used for urban or industrial development. Borrow or fill areas make up 50 to 75 percent of the mapping unit, but the soils are undisturbed in undeveloped lots, in the back part of developed lots, and in small patches of woodland.

Fill areas typically consist of about 1 to 3 feet of fill material overlying undisturbed Glenford soils or inclusions of wetter, lower lying Fitchville soils. The fill is mainly loamy material from the subsoil of Glenford soils. In the borrow areas, the silt or silt loam substratum or subsoil of these soils is exposed. Included in mapping are a few small areas where slopes are 6 to 12 percent.

The surface layer in graded areas commonly has a low organic-matter content and poor tilth. The hazard of erosion is particularly severe if the soil is bare of vegetation during construction. Gullying and sedimentation commonly occur during construction unless conservation practices are used. Capability unit not assigned; woodland suitability group 1o1.

Glenford-Urban land complex, rolling (GoC).—This mapping unit consists of areas where most of the original Glenford soils have been destroyed or covered by grading and digging. Most areas are used for urban or industrial development. Borrow or fill areas make up 50 to 75 percent of the mapping unit, but the soils are undisturbed in undeveloped lots, in the back part of developed lots, and in small wooded areas.

The fill is mainly loamy material from the subsoil of Glenford soils. In the borrow areas, the subsoil or loamy substratum of these soils is exposed.

The surface layer in graded areas commonly has a low organic-matter content and poor tilth. The hazard of erosion is particularly severe if the soil is bare of vegetation during construction. Gullying and sedimentation commonly occur during construction unless conservation practices are used. Slope is a greater limitation to nonfarm uses than it is on less sloping Glenford soils. Capability unit not assigned; woodland suitability group 1o1.

Gravel Pits

Gravel pits (Gp) consists of surface-mined areas that have been developed as a source of construction aggregate. About half of these areas are actively mined. Gravel pits occupy kames and outwash terraces. Typically, they are associated with Chili, Conotton, Oshtemo, and other soils underlain by gravel and sand outwash. Most pits range from 2 to 50 acres in size. Actively mined pits are continually being enlarged. Most pits have a high wall on one or more sides.

The mined material consists of stratified layers of gravel and sand that vary in thickness and orientation. The kind and grain size of aggregate are relatively uniform within any one layer but commonly differ from layer to layer. Some layers contain a significant amount of silt and sand. Selectivity in mining is commonly feasible.

Nearly all of the coarse aggregate material is rounded by abrasive action of water. Quartz, granite, and other siliceous gravel are the dominant material.

The material remaining after mining is poorly suited to plant growth. Organic-matter content and available moisture capacity are low.

Some abandoned gravel pits can be developed as wildlife habitat or recreation areas. This land type is not used for farming or tree production. Capability unit not assigned; woodland suitability group 4.

Haskins Series

The Haskins series consists of gently sloping, somewhat poorly drained soils on undulating terraces in the northern part of the county. These soils formed partly in loamy material 24 to 40 inches thick and partly in the underlying, finer textured calcareous till or lacustrine material.

In a representative profile of a Haskins soil that has been cultivated, the surface layer is dark grayish-brown loam about 10 inches thick. The upper part of the subsoil, to a depth of 20 inches, is pale-brown to light yellowish-brown and brown, friable sandy loam. The next 5 inches is mottled, dark-gray sandy clay loam, and the lower part of the subsoil, to a depth of 33 inches, is yellowish-brown silty clay loam and silty clay. The underlying material is brown silty clay. It extends to a depth of 78 inches or more.

Haskins soils have moderate permeability in the subsoil and slow permeability in the clayey underlying material. The water table is near the surface late in winter and in spring. The rooting zone in these soils is moderately deep, and the available moisture capacity is medium. Where the soils have not been limed, the rooting zone is strongly acid in the upper part.

Most areas of Haskins soils have been farmed, but many of these are not presently farmed. The main crops are corn, wheat, and grass-legume meadow. Artificial drainage is beneficial to crops.

Representative profile of Haskins loam in an area of Haskins-Caneadea complex, 2 to 6 percent slopes, in a formerly cultivated field in Hudson Township, T. 4 N., R. 10 W., 2,200 feet west of railroad and 110 feet north of Barlow Road; (sample No. ST-2 in table 10):

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) loam; weak to moderate, medium, granular structure; friable; 3 percent pebbles; strongly acid; abrupt, smooth boundary.

B1—10 to 15 inches, pale-brown (10YR 6/3) to light yellowish-brown (10YR 6/4) sandy loam; common, distinct, medium, yellowish-brown (10YR 5/8) mottles; weak, medium, subangular blocky structure; friable; 5 percent pebbles; strongly acid; gradual, smooth boundary.

B21—15 to 20 inches, brown (10YR 5/3) sandy loam; many distinct, medium, yellowish-brown (10YR 5/8) mottles; single grain; friable; 5 percent pebbles; small amount of clay bridging in lower part; medium acid; clear, wavy boundary.

B22t—20 to 25 inches, dark-gray (10YR 4/1) sandy clay loam; common, distinct, dark yellowish-brown (10YR 4/4) mottles; massive; friable; common black (10YR 2/1) oxide stains; medium continuous clay films and bridgings on sand grains; 5 percent pebbles; neutral; abrupt, wavy boundary.

IIB23t—25 to 30 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, medium, angular blocky structure; firm; 2 percent pebbles; thin, continuous, gray (10YR 5/1) clay films on peds; neutral; clear, wavy boundary.

IIB24t—30 to 33 inches, yellowish-brown (10YR 5/4) silty clay; common gray (10YR 5/1) streaks in ped interiors; coarse, strong, angular blocky structure; firm; thin, continuous, gray (10YR 5/1) clay films on all ped faces; neutral; gradual, wavy boundary.

IIC—33 to 72 inches, brown (10YR 4/3) silty clay; weak, medium, angular blocky structure grading to massive with depth; firm; thin gray (5Y 5/1) pressure faces or clay films on ped faces; an occasional pebble; calcareous; some carbonate coatings and common concretions.

The solum ranges from about 32 to 48 inches in thickness. It typically extends into the contrasting finer textured material, as evidenced by development of soil structure, the presence of clay films, particularly on vertical faces, and leaching or partial leaching of carbonates. The Ap horizon is loam and silt loam. In the upper part of the B horizon, the matrix has hues of 10YR and 2.5Y, value of 4 to 6, and chroma of 1 to 4. This part of the B horizon has common to many distinct mottles, its texture is dominantly loam, sandy loam, or sandy clay loam, and it is 2 to 10 percent gravel. The depth to the IIB horizon ranges from 24 to 40 inches. The horizon is typically yellowish brown (10YR 5/4) or dark brown (10YR 4/3) and has gray (5Y 5/1 or 10YR 5/1) ped faces. The part of the Bt horizon formed in loamy material is thick enough that the weighted average clay content of the Bt horizon is less than 35 percent. The B horizon ranges from strongly acid to neutral. The C horizon is calcareous and is either lacustrine material or dense glacial till.

Haskins soils commonly are near Jimtown and Caneadea soils. They are finer textured in the lower part of the B horizon than Jimtown soils, and they have a clayey contrasting C horizon that Jimtown soils do not have. Haskins soils are much coarser textured than Caneadea soils in the A horizon and in the upper part of the B horizon.

In Summit County, Haskins soils are mapped only in complexes with Caneadea soils and with Bogart soils.

Haskins-Caneadea complex, 2 to 6 percent slopes (HcB).—The soils in this complex are on slight rises adjacent to Carlisle and Canadice soils. Slope is generally less than 3 percent but, in a few areas, is 4 to 6 percent. Most areas are irregular in shape and range from 2 to 20 acres in size. The surface layer is silt loam or loam. Haskins soils make up about 40 to 50 percent of the complex, and Caneadea soils about 30 to 40 percent. Included in mapping are some areas of Jimtown soils.

Runoff is slow to medium. The soils are saturated to within 6 to 12 inches of the surface during wet periods in winter and spring. Wetness and erosion are moderate hazards to farming, and seasonal wetness limits the use of these soils for many nonfarm purposes. Capability unit IIw-2; woodland suitability group 3w1.

Holly Series

The Holly series consists of nearly level, poorly drained soils. These soils formed in recent alluvium on flood plains throughout the county.

In a representative profile of a Holly soil, the surface layer is dark grayish-brown silt loam about 3 inches thick. The upper part of the subsoil, to a depth of 14 inches, is friable, dark-gray silt loam. The lower part of the subsoil, to a depth of 27 inches, is friable, gray sandy loam. The underlying material is stratified, gray and dark-gray loam, sandy loam, and gravelly sand.

Holly soils have a high water table in winter, in spring, and early in summer, and they are subject to flooding. Permeability is moderately slow, and available moisture capacity is high. The rooting zone in these soils is deep when the water table is low in summer and where the soils are drained. Where the soils have not been limed, the rooting zone is medium acid or slightly acid.

Much of the acreage is wooded. Cleared areas are cultivated or used for pasture. Artificial drainage is beneficial to crops, but outlets are difficult to establish in some places.

Representative profile of Holly silt loam, in Bath Township, T. 3 N., R. 12 W., 1,100 feet east of Hametown Road and 2,200 feet south of Granger Road:

A1—0 to 3 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable; slightly acid; clear, wavy boundary.

B1g—3 to 9 inches, dark-gray (5Y 4/1) silt loam; common, fine, distinct, brown (7.5YR 4/4) mottles; weak, medium, subangular blocky structure; friable; slightly acid; clear, smooth boundary.

B21g—9 to 14 inches, dark-gray (5Y 4/1) silt loam; common, medium, prominent, yellowish-red (5YR 4/6) mottles; weak, coarse, subangular blocky structure; friable; slightly acid; clear, smooth boundary.

B22g—14 to 27 inches, gray (5Y 5/1) sandy loam; common, medium and fine, prominent, brown (7.5YR 4/4) and strong-brown (7.5YR 5/6) mottles; weak, coarse, subangular blocky structure; friable; slightly acid; clear, wavy boundary.

C1g—27 to 35 inches, gray (N 5/0) heavy loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; massive; friable; slightly acid; clear, wavy boundary.

IIC2g—35 to 43 inches, dark-gray (N 4/0) sandy loam; massive; friable; mildly alkaline; clear, wavy boundary.

IIIC3g—43 to 60 inches, dark greenish-gray (5BG 4/1) gravelly sand; single grain; loose; mildly alkaline.

Thickness of the loamy deposits over other material ranges from 40 inches to more than 48 inches. The A1 horizon has a hue of 10YR, value of 3 or 4, and chroma of 1 or 2. The B horizon is medium acid or slightly acid. The solum is mainly silt loam, sandy loam, or loam.

The Holly soil in mapping unit Hy (Holly silt loam, alkaline) has a higher reaction throughout the profile than the defined range for the Holly series, but this does not greatly affect its usefulness or behavior.

Holly soils are the poorly drained members of a drainage sequence that includes the well drained Chagrin soils, the moderately well drained Lobdell soils, the somewhat poorly drained Orrville soils, and the very poorly drained Sloan soils. They are commonly adjacent to those soils and to Sebring and Damascus soils. Holly soils have grayer colors than the Orrville soils. They typically have a lighter colored A horizon than Sloan soils. Holly soils generally have less clay in the B horizon than Sebring and Damascus soils, and they are not so acid as those soils.

Holly silt loam (Ho).—This nearly level soil is on narrow flood plains and in strips on large flood plains. Areas of this soil are generally less than 50 acres in size. A profile of this soil is described as representative for the series. Included in mapping are small areas of very poorly drained Sloan soils and somewhat poorly drained Orrville soils, areas where glacial till is within a depth of 40 inches, and few spots of soils that have a very dark gray surface layer as much as 6 inches thick.

Runoff is slow to ponded. Because these soils are in low areas along streams, they are subject to flooding. Wetness is a severe limitation for farming. Flooding is a hazard to most nonfarm uses of this soil. Capability unit IIIw-1; woodland suitability group 2w1.

Holly silt loam, alkaline (Hy).—This nearly level soil is in narrow strips on the flood plains, mainly along the Tuscarawas River. This soil has a profile similar to the one described as representative for the series, except that it is mildly alkaline throughout. Included in mapping are small areas of somewhat poorly drained Orrville soils.

Runoff is very slow to ponded. Flooding and seasonal wetness are severe hazards to farming and a limitation or hazard to most other uses of this soil. Capability unit IIIw-1; woodland suitability group 2w1.

Jimtown Series

The Jimtown series consists of deep, somewhat poorly drained, nearly level to gently sloping soils. These soils formed in loamy outwash overlying sand and gravel outwash of Wisconsin age. They are on outwash terraces throughout the county.

In a representative profile of a Jimtown soil that has been cultivated, the surface layer is dark grayish-brown loam about 11 inches thick. The upper part of the subsoil, to a depth of 16 inches, is light brownish-gray loam. Below this, to a depth of 22 inches, it is grayish-brown loam. The lower part of the subsoil, to a depth of 30 inches, is grayish-brown and brown sandy loam. Below this, to a depth of 41 inches, it is dark yellowish-brown sandy loam. Below this subsoil, between depths of 41 and 60 inches or more, the underlying material is medium acid, loose outwash sand and gravel.

Jimtown soils have moderately rapid permeability in the subsoil and rapid permeability in the underlying sand and gravel. The water table is near the surface late in winter and in spring. The rooting zone in these soils is moderately deep to deep, and where the soils have not been limed, it is strongly acid to medium acid. Penetration of most roots generally is limited to the depth of coarse sand and gravel. The available moisture capacity is low.

Most areas of Jimtown soils are not presently farmed. Where these soils are cultivated, the main crops are corn, wheat, and grass-legume. Artificial drainage is beneficial to crops.

Representative profile of Jimtown loam, 0 to 2 percent slopes, in a cultivated field, 200 feet east of Pressler Road, 1,100 feet south of Krumroy Road, and one-half mile south of Lakemore Village in Springfield Township, T. 1 N., R. 10 W.:

Ap—0 to 11 inches, dark grayish-brown (10YR 4/2) loam; moderate, medium, granular structure; friable; many roots; slightly acid; abrupt, smooth boundary.

B1—11 to 16 inches, light brownish-gray (2.5Y 6/2) loam; many, fine, distinct, strong-brown (7.5YR 5/6) mottles; weak, medium, subangular blocky structure; friable, hard when dry; common roots; thin, very patchy, brown (7.5YR 5/2) clay films in pores; about 2 percent pebbles; strongly acid; clear, smooth boundary.

B21tg—16 to 22 inches, grayish-brown (2.5Y 5/2) loam; common, distinct, strong-brown (7.5YR 5/6) mottles; weak to moderate, medium, subangular blocky structure; firm, hard when dry; few roots; thin, patchy, strong-brown (7.5YR 5/6) clay films in pores and bridging sand grains; common, fine, dark-brown (10YR 3/3) oxide stains; 3 percent pebbles; strongly acid; clear, smooth boundary.

B22tg—22 to 30 inches, grayish-brown (2.5Y 5/2) and brown (10YR 4/3) sandy loam; massive; friable, hard when dry; thin, patchy, grayish-brown (2.5YR 5/2) and brown (10YR 4/3) clay films bridging sand grains and in pores; common, fine, dark-brown (10YR 3/3) oxide stains; 3 percent pebbles; strongly acid; clear, smooth boundary.

B23t—30 to 41 inches, dark yellowish-brown (10YR 4/4) sandy loam; massive; friable; thin patchy clay films bridging and coating sand grains; about 3 percent pebbles; medium acid; clear, wavy boundary.

C1—41 to 50 inches, yellowish-brown (10YR 5/6) sand; single grain; loose; about 10 percent pebbles; medium acid; clear, smooth boundary.

C2—50 to 60 inches, dark grayish-brown (10YR 4/2) coarse sand and fine gravel; single grain; loose; medium acid.

The solum ranges from 35 to 48 inches in thickness. The A1 horizon, where present, ranges from 3 to 5 inches in thickness and is very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) in color. An A2 horizon 2 to 8 inches thick and typically grayish brown (10YR 5/2) underlies the A1 horizon. The Ap horizon generally is dark grayish brown (10YR 4/2) or grayish brown (2.5Y 5/2) and dominantly loam, sandy loam, or silt loam. The B horizon ranges from 24 to 32 inches in thickness. The matrix of the B2 horizon has a value of 4 or 5 and a chroma of 2 to 4, but a chroma of 2 is dominant on either the ped faces or in the matrix. Mottles having a chroma of 4 to 6 occur in the Bt horizon. The clay content of the B horizon ranges from 12 to 28 percent, and the weighted average of the upper 20 inches of the Bt horizon is slightly less than 18 percent. The B horizon is loam, gravelly loam, sandy loam, or light sandy clay loam. The upper part of the horizon ranges from weak to moderate in structure. Reaction is medium acid to strongly acid.

The Jimtown soils in this county have a weighted average clay content in the upper 20 inches of the Bt horizon that is slightly less than the defined range for the series, but this does not alter their usefulness or behavior.

Jimtown soils are the somewhat poorly drained members of a drainage sequence that includes the well drained Chili soils, the moderately well drained Bogart soils, the poorly drained Damascus soils, and the very poorly drained Olmsted soils. They are commonly adjacent to Bogart, Fitchville, and Chili soils. The Jimtown soils are similar in texture to Bogart and Chili soils, but they have more gray in the B horizon. Jimtown soils have a lower silt content and higher sand content than Fitchville soils.

Jimtown loam, 0 to 2 percent slopes (JtA).—This soil is in areas that are mostly irregular in shape and range from 5 to 20 acres in size. A profile of this soil is described as representative for the series. Included in mapping are small spots of wetter Damascus soils in low areas and in shallow depressions, areas of soils that have a silt loam surface layer, and small spots of the more silty Fitchville soils.

Runoff is slow. Seasonal wetness is a moderate limitation to cultivated crops and is a limitation to many nonfarm uses of this soil. Capability unit IIw-2; woodland suitability group 2w2.

Jimtown loam, 2 to 6 percent slopes (JtB).—This soil is in areas that are irregular in shape and generally are less than 10 acres in size. Included in mapping are small areas of the more silty Fitchville soils near upland glacial till areas and areas of soils that have a silt loam surface layer.

Runoff is slow, and wetness and erosion are moderate hazards to farming. Seasonal wetness is a limitation to many nonfarm uses of these soils. Capability unit IIw-2; woodland suitability group 2w2.

Jimtown-Urban land complex (Ju).—This mapping unit consists of areas where most of the original Jimtown soils has been destroyed or covered by grading and digging. Slopes are 2 to 6 percent. Most areas are used for urban or industrial development. Borrow or fill areas make up 50 to 75 percent of the mapping unit, but the soils are undisturbed in undeveloped lots, in the back part of developed lots, and in small wooded areas.

Fill areas typically consist of about 1 to 3 feet of fill material overlying undisturbed Jimtown soils or inclusions of wetter, lower lying Sebring and Carlisle soils. The fill is loamy material from the subsoil or gravelly material from the substratum of Jimtown soils. In the borrow areas, the subsoil or substratum of these soils is exposed.

The surface layer in graded areas commonly has a low organic-matter content and poor tilth. It is droughty, and seed germination can be poor. A seasonal high water table is a limitation to many nonfarm uses of these soils. Capability unit not assigned; woodland suitability group 2w2.

Linwood Series

The Linwood series consists of organic soils that are very poorly drained. These soils formed in organic deposits 16 to 42 inches thick. They are in depressional areas on stream terraces.

A representative Linwood soil consists of black muck that extends to a depth of 24 inches. Beneath the muck is dark greenish-gray, friable loam that extends to a depth of 60 inches or more.

Linwood soils are moderately permeable. They have a high water table at or near the surface for long periods unless they have been artificially drained. The rooting zone of these soils is very shallow, except late in summer when the water table is lowest. They have a high available moisture capacity and are medium acid in the root zone.

Most areas of Linwood soils are cleared but are not cultivated. Some areas are pastured.

Representative profile of Linwood muck, in an abandoned pasture in sec. 13, Franklin Township, 800 feet west of main road in Portage Lakes State Park:

Oa1—0 to 18 inches, black (N 2/0) nonfibrous muck, (sapric material); a few, fine, distinct, strong-brown (7.5YR 5/8) mottles; moderate, coarse, granular structure; friable; medium acid; clear, smooth boundary.

Oa2—18 to 24 inches, black (N 2/0) muck, (sapric material); few fibers; massive; friable; medium acid; abrupt, smooth boundary.

IICg—24 to 60 inches, dark greenish-gray (5BG 4/1) loam; a few, medium, distinct, yellowish-brown (10YR 5/8) mottles; massive; friable; slightly acid.

The thickness of the organic layer ranges from 16 to 42 inches in drained areas. Where the organic layer is thicker than 27 inches, the fiber content commonly increases in the lower part of the layer. The underlying mineral material has a hue of 5Y or 5BG, value of 4 or 5, and chroma 0 or 1. The underlying material is sandy loam, loam, and silt loam. It is slightly acid to neutral.

Linwood soils occupy positions on landscapes similar to those of the Carlisle, Willette, Lorain, Luray, and Olmsted soils. They formed in thinner organic material than Carlisle soils. Linwood soils have a more loamy IIC horizon than Willette soils. They differ from Lorain, Luray, and Olmsted soils in having formed in organic material rather than mineral material.

Linwood muck (Ld).—This soil commonly is in areas at the outer edges of larger areas of Carlisle muck in the southern part of the county. Most areas are less than 5 acres in size. The organic material subsides if the soil is artificially drained. Included in mapping are areas of soils that are strongly acid in the organic layer.

Wetness is a severe limitation to cultivated crops. Drainage is possible, but outlets are difficult to establish in some areas. Wetness and instability are limitations to most nonfarm uses of this soil. Capability unit IIIw-5; woodland suitability group 4.

Lobdell Series

The Lobdell series consists of nearly level, moderately well drained soils. These soils formed in alluvium on flood plains throughout the county.

In a representative profile of a Lobdell soil in a wooded area, the surface layer is dark grayish-brown silt loam about 3 inches thick. The subsoil, to a depth of 31 inches, is brown, friable silt loam. It is mottled with light brownish-gray below a depth of 23 inches. The underlying material, to a depth of 52 inches, is grayish-brown silt loam. Below this, to a depth of 60 inches, it is dark-gray sandy loam.

Lobdell soils are subject to occasional flooding in the spring. Permeability is moderate. The rooting zone is deep and generally is medium acid in the upper 2 or 3 feet. The available moisture capacity is high. The lack of mottles in the upper part of the subsoil is evidence that wetness is not a major limitation for extended periods.

Most areas of Lobdell soils have been farmed, but most of these are not presently cultivated. Where the soils are cultivated, the main crops are sweet corn, corn, oats, and grasses and legumes.

Representative profile of Lobdell silt loam, in a wooded area in Twinsburg Township, T. 5 N., R. 10 W., 1 mile north of Twinsburg Village Center, 2,100 feet west of State Route 91, and 100 feet east of Tinkers Creek along pipeline:

A1—0 to 3 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, granular structure; friable; medium acid; clear, wavy boundary.

B2—3 to 23 inches, brown (7.5YR 4/4) silt loam; weak, medium, subangular blocky structure; friable; medium acid; clear, smooth boundary.

B3—23 to 31 inches, brown (10YR 4/3) silt loam; common, medium, distinct, light brownish-gray (2.5YR 6/2) mottles; massive; friable; medium acid; clear, smooth boundary.

C1g—31 to 52 inches, grayish-brown (2.5Y 5/2) silt loam; common, medium, distinct, dark-brown (10YR 4/3) mottles; massive; friable; medium acid; clear, smooth boundary.

C2g—52 to 60 inches, dark-gray (5Y 4/1) sandy loam; common, coarse, distinct, yellowish-brown (10YR 5/6) mottles; massive; friable; medium acid.

To a depth of 40 inches, the reaction is strongly acid to slightly acid and the texture is silt loam, loam, or sandy loam. The B2 matrix of the horizon is brown (10YR 4/3), dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/4), or brown (7.5YR 4/4). Depth to low-chroma mottling ranges from 20 to 24 inches. Mottles in the C horizon are yellowish brown (10YR 5/6 or 5/8), light brownish gray (2.5Y 6/2), grayish brown (2.5Y 5/2), or dark brown (10YR 4/3).

Lobdell soils are the moderately well drained members of a drainage sequence that includes the well drained Chagrin soils, the somewhat poorly drained Orrville soils, the poorly drained Holly soils, and the very poorly drained Sloan soils. They are commonly adjacent to those soils.

Lobdell silt loam (Le).—This nearly level soil is in narrow strips on small flood plains. Included in mapping are small areas of somewhat poorly drained Orrville soils in meandering channels and areas of soils that have a loam surface layer and are in better tilth than this Lobdell soil.

Runoff is slow, and the soil is subject to flooding. Flash floods of short duration occur in some places. Flooding is a hazard to crops early in spring. Summer-grown crops generally are planted after the normal time of flooding. Flooding is a major hazard to most nonfarm uses of this soil. Capability unit IIw-5; woodland suitability group 1o1.

Lorain Series

The Lorain series consists of dark-colored, very poorly drained, nearly level soils. These soils formed in water-deposited sediment that is high in content of clay. They are in low areas in old glacial lakebeds, mainly in the northern part of the county.

In a representative profile of a Lorain soil that has been cultivated, the surface layer is very dark gray silty clay loam about 8 inches thick. The upper part of the subsoil, to a depth of 16 inches, is firm, grayish-brown silty clay. The lower part of the subsoil, to a depth of 30 inches is firm, gray silty clay. The underlying material, to a depth of 41 inches, is gray silty clay mottled with

yellowish brown. Below this, to a depth of 50 inches, it is silty clay loam with gray and olive-brown mottles.

Lorain soils have slow permeability in both the subsoil and the underlying clayey material. They are saturated with free water for a long period late in winter, in spring, and early in summer. They dry out slowly in spring. The rooting zone in these soils is deep only in summer when the water table is lowest or in areas where the soils are drained. The rooting zone is slightly acid to neutral. The available moisture capacity is medium, but seepage from adjacent areas prevents crop damage from drought.

Most areas of Lorain soils are not presently farmed. Most areas need improved drainage for good crop growth. Some areas are in pasture, and some are wooded.

Representative profile of Lorain silty clay loam, in an abandoned crop field 2¼ miles southeast of Twinsburg Village Center, Twinsburg Township, T. 5 N., R. 10 W., 3,000 feet north of Old Mill Road and 150 feet west of railroad:

Ap—0 to 8 inches, very dark gray (10YR 3/1) silty clay loam; strong, medium, granular structure; friable; slightly acid; abrupt, smooth boundary.

B21tg—8 to 16 inches, grayish-brown (2.5Y 5/2) silty clay; many, fine and medium, distinct, yellowish-brown (10 YR 5/6) mottles; moderate, medium, prismatic structure parting to moderate, medium, angular blocky structure; firm; thin, patchy, dark-gray (5Y 4/1) clay films on vertical ped faces; patchy on horizontal ped faces; slightly acid; clear, smooth boundary.

B22tg—16 to 30 inches, gray (5Y 5/1) silty clay; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, coarse, prismatic structure; firm; thin and medium, patchy, gray (5Y 5/1) clay films on vertical ped faces; thin, patchy, clay films in pores in ped interiors; neutral; clear, wavy boundary.

C1—30 to 41 inches, gray (5Y 5/1) silty clay; many, medium, distinct, yellowish-brown (10YR 5/8) mottles; massive; firm; a few calcium carbonate concretions; mildly alkaline and calcareous; abrupt, smooth boundary.

C2—41 to 60 inches, yellowish-brown (10YR 5/4) silty clay loam; massive; friable; common, medium, distinct, gray (N 5/0) and olive-brown (2.5Y 4/3) mottles; mildly alkaline and calcareous.

The depth to calcareous material and the thickness of the solum are typically 30 to 40 inches. The upper part of the Bt horizon ranges from strongly acid to slightly acid. The Ap and A1 horizons are very dark gray (10YR 3/1) or black (10YR 2/1). The A horizon ranges from 6 to 10 inches in thickness. The Bt horizon ranges from 20 to 28 inches in thickness, and its matrix has a hue of 10YR, 2.5Y, or N, value of 4 or 5, and chroma of 0, 1, or 2. The Bt horizon is typically silty clay, but it is heavy silty clay loam and clay in some places. The material is typically stratified, and the ratio of clay content in the B horizon to that in the A horizon is less than 1.2 in some places. The B horizon has a typically weak or moderate, medium and coarse, prismatic structure that parts easily to moderate to strong, medium to coarse, angular blocky structure.

Lorain soils are the very poorly drained members of a drainage sequence that includes the moderately well drained Geeburg soils, the somewhat poorly drained Caneadea soils, and the poorly drained Canadice soils. They are commonly adjacent to Luray, Carlisle, Canadice, and Sebring soils. Lorain soils contain more clay than Sebring and Luray soils, and they typically have a darker A horizon than Sebring, Caneadea, and Canadice soils.

Lorain silty clay loam (Ln).—This nearly level soil is in areas that are mostly less than 10 acres in size. The most extensive areas are in Hudson and Twinsburg Townships and in Stow Village. The surface layer has a high organic-matter content.

Included in mapping are small areas of soils that have a dark-colored surface layer more than 10 inches thick. Also included, particularly in the lowest part of the landscape, are areas of soils that have a thin, mucky surface layer. Other inclusions are small spots of more silty Luray soils, a few areas of soils that have a silty clay or silt loam surface layer, and a few areas of a Lorain silty clay that has slopes of 2 to 4 percent and is adjacent to steep valley walls in the Cuyahoga River Valley.

Wetness is a severe limitation if this soil is used for cultivated crops. Drainage is generally inadequate for intensive use of these areas, and consequently many areas are no longer cultivated. A high water table and slow permeability are major limitations to most nonfarm uses of this soil. Capability unit IIIw-6; woodland suitability group 2w1.

Loudonville Series

The Loudonville series consists of gently sloping to steep, moderately deep, well-drained soils. These soils formed partly in glacial till of Wisconsin age and partly in residuum weathered from the underlying sandstone bedrock. They are on uplands throughout the county. Sandstone bedrock is at a depth of 20 to 40 inches.

In a representative profile of a Loudonville soil that has been cultivated, the plow layer is silt loam about 7 inches thick. The upper part of the subsoil, to a depth of 12 inches, is brown silt loam. Below this, to a depth of 21 inches, it is brown clay loam. The lower part of the subsoil, to a depth of 35 inches, is firm, yellowish-brown clay loam. Sandstone bedrock is at a depth of 35 inches. The subsoil immediately above the bedrock has many fragments of sandstone.

Loudonville soils have moderate permeability above the sandstone bedrock. They warm up and dry out quickly in spring. The rooting zone in these soils is moderately deep and strongly acid, and available moisture capacity is medium to low.

Much of the acreage is wooded or is not presently farmed. In cultivated areas the main crops are corn and grass-legume meadow.

Representative profile of Loudonville silt loam, 6 to 12 percent slopes, in a formerly cultivated field in Bath Township, T. 3 N., R. 12 W., 1¾ miles west of Bath, 1,300 feet west of Hametown Road, and 5,700 feet south of Everett Road:

Ap1—0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; very strongly acid; abrupt, smooth boundary.

Ap2—2 to 7 inches, brown (10YR 4/3) silt loam; moderate, fine and medium, granular structure; friable; 12 percent coarse fragments; very strongly acid; abrupt, smooth boundary.

B1—7 to 12 inches, brown (7.5YR 5/4) silt loam; moderate, medium, subangular blocky structure; friable; about 15 percent coarse fragments; strongly acid; clear, smooth boundary.

B21t—12 to 21 inches, brown (7.5YR 5/4) clay loam; moderate, medium, subangular blocky structure; firm; thin, patchy, brown (7.5YR 5/4) clay films on ped faces; about 15 percent coarse fragments; strongly acid; clear, smooth boundary.

B22t—21 to 29 inches, yellowish-brown (10YR 5/4) clay loam; moderate, medium and fine, subangular blocky structure; firm; medium, patchy, dark yellowish-brown (10YR 4/4) clay films on ped faces; about 10 percent

coarse fragments; strongly acid; clear, smooth boundary.

IIB23t—29 to 35 inches, yellowish-brown (10YR 5/4) channery clay loam; common, fine, distinct, light yellowish-brown (2.5Y 6/4) mottles and fine, medium, distinct, yellowish-brown (10YR 5/8) mottles; massive; firm; thin patchy clay films on sandstone fragments; strongly acid; abrupt, smooth boundary.

R—35 inches, sandstone bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The Ap horizon is dark grayish brown (10YR 4/2) or brown (10YR 4/3). The A1 horizon is 2 to 3 inches thick and very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2). The A2 horizon is 4 to 7 inches thick and is yellowish brown (10YR 5/4) and brown (10YR 5/3). The Bt horizon ranges from 13 to 25 inches in thickness. It has a hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 5. Mottles occur in some places, but mottles that have a chroma of 2 or less do not occur in the upper 10 inches of the horizon. The texture ranges from loam or silt loam to clay loam or silty clay loam. Reaction is very strongly acid to medium acid. The IIB horizon is absent in some places. Coarse fragments in the IIB horizon range from 15 to 35 percent, by volume. The bedrock has some fractures.

Loudonville soils occupy positions on the landscape similar to those of the Wooster, Rittman, and Ellsworth soils. Loudonville soils are better drained and have a less clayey B horizon than Ellsworth soils. They are better drained than Rittman soils and lack a fragipan.

Loudonville silt loam, 2 to 6 percent slopes (LoB).—This soil is on the upper part of hillsides. Most areas are no more than 10 acres in size. This soil is commonly adjacent to areas of moderately well drained Rittman, Ellsworth, or Canfield soils and well drained Dekalb and Wooster soils. Included in mapping are small spots of Rittman and Wooster soils.

Runoff is medium, and erosion is a moderate hazard in cultivated areas. Moderate depth to bedrock is a limitation to some nonfarm uses of this soil. Capability unit IIe–2; woodland suitability group 2o1.

Loudonville silt loam, 6 to 12 percent slopes (LoC).—This soil is in elongated areas on the upper part of hillsides. A profile of this soil is described as representative for the series. Included in mapping, in Twinsburg Township, are areas of soils that have a loam or sandy loam surface layer.

Most areas of this soil are wooded. Runoff is rapid, and the hazard of erosion is severe if this soil is cultivated. Moderate depth to bedrock and slope are limitations to some nonfarm uses of this soil. Capability unit IIIe–2; woodland suitability group 2o1.

Loudonville silt loam, 6 to 12 percent slopes, moderately eroded (LoC2).—This soil is in elongated areas on the upper part of hillsides. It has a profile similar to the one described as representative for the series, except that as much as 8 inches of the original surface layer has been removed through erosion. The present plow layer is a mixture of the original surface layer and brown subsoil material. In a few areas the present surface layer is mostly brown material that formerly was subsoil. The organic-matter content of the surface layer is lower than is typical because of erosion. Sandstone fragments, 2 to 3 inches in diameter, are common on the surface. Sandstone bedrock is exposed in a few spots.

Runoff is rapid, and the hazard of erosion is severe in cultivated areas. A moderate to shallow depth to bedrock and slope are limitations to some nonfarm uses of this soil. Capability unit IIIe–2; woodland suitability group 2o1.

Loudonville silt loam, 12 to 18 percent slopes (LoD).—This soil is in narrow strips on hillsides and on side slopes adjacent to drainageways. Included in mapping are areas of soils that are moderately eroded and small spots of Dekalb soils.

Runoff is rapid, and the hazard of erosion is very severe if the soil is cultivated. Slope and moderate depth to bedrock are limitations to most nonfarm uses of this soil. Capability unit IVe–1; woodland suitability group 2r1.

Loudonville silt loam, 18 to 25 percent slopes (LoE).—This soil is on hillsides and side slopes adjacent to drainageways. Included in mapping are small spots of Dekalb soils.

Runoff is very rapid. Slope is the dominant limitation to the use of this soil for farming. This soil is better suited to pasture or hay than to cultivated crops. Moderate depth to bedrock and slope are limitations to many nonfarm uses. Capability unit VIe–1; woodland suitability group 2r1.

Loudonville-Urban land complex, rolling (LuC).—This mapping unit consists of areas where much of the original Loudonville soils has been destroyed or covered by grading and digging. Most areas are used for urban or industrial development. Borrow or fill material makes up 50 to 75 percent of the mapping unit, but the soils are undisturbed in undeveloped lots, in the back part of developed lots, and in small wooded areas.

The fill material is loamy material from the subsoil of Loudonville soils or fragments of sandstone. In the borrow areas, the subsoil of these soils or sandstone bedrock is exposed.

The surface layer in graded areas commonly has a low organic-matter content, low fertility, and poor tilth. Unless erosion control practices are used during construction work, the hazard of erosion is severe, particularly if the soil is bare of vegetation. Capability unit not assigned; woodland suitability group 2o1.

Luray Series

The Luray series consists of dark-colored, very poorly drained soils that formed in sediment high in content of silt. These soils are in depressions in level areas of old glacial lakebeds and in small depressions on uplands throughout the county.

In a representative profile of a Luray soil that has been cultivated, the surface layer is black silt loam about 11 inches thick. The upper part of the subsoil, to a depth of 22 inches, is friable, olive-gray heavy silt loam. The lower part of the subsoil, to a depth of 40 inches, is firm, olive-gray silty clay loam. Distinct, yellowish-brown mottles are present throughout the subsoil. The underlying material, to a depth of 60 inches, is gray silt loam.

Luray soils have moderately slow permeability in both the subsoil and the substratum. They are saturated with free water for long periods late in winter, in spring, and early in summer. Luray soils are soft and compressible when wet. They dry out slowly in spring. The rooting zone is deep in drained areas and in summer when the water table is low. These soils have a high available moisture capacity and are medium acid to neutral.

Most areas of these soils have been cleared and cultivated, but only a few of these are presently cultivated. Most areas need artificial drainage for good crop growth.

Representative profile of Luray silt loam, in a cultivated field in Copley Township, T. 2 N., R. 12 W., 2,000 feet east of Jacoby Road, 3,200 feet north of Wright Road, and 2,000 feet west of Black Pond:

Ap—0 to 6 inches, black (10YR 2/1) silt loam; strong, medium and fine, granular structure; friable; medium acid; abrupt, smooth boundary.

A12—6 to 11 inches, black (10YR 2/1) silt loam; few, fine, distinct, brown (10YR 4/3) and yellowish-brown (10YR 5/8) mottles; moderate, medium, subangular blocky structure; friable; medium acid; clear, irregular boundary.

B21tg—11 to 22 inches, olive-gray (5Y 5/2) heavy silt loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, prismatic structure parting to moderate, medium, subangular blocky structure; friable; thin, patchy, dark-gray (10YR 4/1) clay films on vertical ped faces; medium acid; gradual, wavy boundary.

B22tg—22 to 30 inches, olive-gray (5Y 5/2) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, prismatic structure parting to weak, medium, subangular blocky structure; firm; thin, patchy, gray (N 5/0) clay films on ped faces; few black (10YR 2/1) concretions; medium acid; gradual, wavy boundary.

B23tg—30 to 40 inches, olive-gray (5Y 4/2) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, coarse, prismatic structure; firm; thin, patchy, gray (N 5/0) clay films on vertical ped faces; patchy on horizontal faces; slightly acid; clear, wavy boundary.

C—40 to 60 inches, gray (5Y 5/1) silt loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; friable; massive; neutral.

The solum thickness ranges from 35 to 50 inches in thickness. The A horizon is black (10YR 2/1) and very dark gray (10YR 3/1) and ranges from 10 to 12 inches in thickness. The A horizon is typically medium acid to neutral. The Bt horizon ranges from 18 to 30 inches in thickness, and its matrix has a hue of 10YR, 2.5Y, 5Y, or N, value of 4 or 5, and chroma of 0, 1, or 2. In some places the lower part of the Bt horizon has dominant chromas of 3 to 6 and prominent grayish mottles. The texture of the B horizon ranges from silt loam to silty clay loam. The weighted average clay content ranges from about 25 percent to 35 percent. Because of stratification the ratio of clay in the B horizon to clay in the A horizon is less than 1.2 in some places. The B horizon has weak to moderate, prismatic structure parting to moderate to weak, medium to coarse, subangular or angular blocky structure. The upper part of the B horizon ranges from medium acid to neutral. In some places there is a B3 horizon, 8 to 12 inches thick, that has weak, coarse, subangular blocky structure.

Luray soils are the very poorly drained members of a drainage sequence that includes the moderately well drained Glenford soils, the somewhat poorly drained Fitchville soils, and the poorly drained Sebring soils. They are commonly adjacent to Lorain, Carlisle, Sebring, and Canadice soils. Luray soils contain less clay than Lorain and Canadice soils, and they have a darker A horizon than Sebring and Canadice soils.

Luray silt loam (Ly).—This nearly level soil is in areas that are roughly circular in shape and are more than 10 acres in size. The largest areas are in Copley and Green Townships. Included in mapping are areas of soils that have a surface layer less than 10 inches thick, areas of mucky soils, and spots of Luray soils that have a silty clay loam surface layer and are difficult to work.

Seasonal saturation is a severe limitation if this soil is used for cultivated crops. Excessive wetness and moderately slow permeability are limitations to most nonfarm uses of this soil. Capability unit IIw-3; woodland suitability group 2w1.

Made Land

Made land consists of Made land, chemical waste, and Made land, sanitary fill.

Made land, chemical waste (Ma).—This mapping unit consists of industrial settling basins that have collected precipitated alkali chemical wastes. These basins are 100 to 250 acres in size and have dikes that are 20 to 30 feet high. Some basins have an accumulation of waste that is within 2 to 3 feet of the top of the dikes. Most areas of this land type have been developed on flood plains. Little or no vegetation grows on these deposits. Capability unit not assigned; woodland suitability group 4.

Made land, sanitary fill (Md).—This mapping unit consists of areas of nonarable fill. The fill includes rubber, lumber, and other debris of industrial origin. A few community sanitary land fills also are included. Most areas of Made land, sanitary fill, are 2 to 20 acres in size, and the depth of the fill varies. A few areas on the west side of Akron have 5 to 20 feet of fill over organic soils.

Made land, sanitary fill, commonly has poor physical characteristics. In some areas the fill is calcareous. In most areas erosion is a severe hazard unless vegetation is established. Capability unit not assigned; woodland suitability group 4.

Mahoning Series

The Mahoning series consists of nearly level to gently sloping, somewhat poorly drained soils. These soils formed in silty clay loam or clay loam glacial till of Wisconsin age. They are on uplands in the northern part of the county.

In a representative profile of a Mahoning soil that has been cultivated, the plow layer is dark grayish-brown silt loam about 6 inches thick. The upper part of the subsoil, to a depth of 11 inches, is light brownish-gray silt loam. The middle part of the subsoil, between depths of 11 and 24 inches, is grayish-brown and yellowish-brown silty clay loam. The lower part of the subsoil is dark yellowish-brown silty clay loam that extends to a depth of 42 inches. The subsoil is much more clayey than the plow layer. Between depths of 32 and 73 inches, the underlying material is dark-brown silty clay loam till. This till material is compact and limy and contains many pebbles and fragments of shale and siltstone.

Mahoning soils have slow permeability in the subsoil and the underlying glacial till. They are saturated with free water late in winter and in spring. They dry out slowly in spring unless they have been artificially drained. The rooting zone in these soils is mostly moderately deep, and available moisture capacity is medium. The profile is strongly acid in the upper 17 inches and medium acid to neutral in the lower part.

Most areas of Mahoning soils are not presently cultivated. Some areas are used for pasture, and some are wooded. Areas that are cultivated are used mostly for grasses and legumes, wheat, and corn. Most of the acreage needs to be drained for intensive crop production.

Representative profile of Mahoning silt loam, 0 to 2 percent slopes, in a cultivated field, one-half mile south of the Ohio Turnpike and one-half mile east of Moran Road in the village of Hudson, on grounds of Western

Reserve Academy in Hudson Township, T. 4 N., R. 10 W., (sample No. ST-1 in table 10):

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable; many roots; 1 percent coarse fragments; neutral; abrupt, smooth boundary.

B1—6 to 11 inches, light brownish-gray (2.5Y 6/2) silt loam; many, medium, distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium, subangular blocky structure; firm; common fine pores; common roots; 1 percent coarse fragments; strongly acid; clear, wavy boundary.

B21tg—11 to 17 inches, grayish-brown (2.5Y 5/2) silty clay loam; many, medium, grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/8) mottles in ped interiors; moderate, medium, prismatic structure parting to moderate, coarse, subangular blocky structure; firm; common fine pores; common roots; thin, continuous, grayish-brown (2.5Y 5/2) clay films on ped faces; on the vertical faces about half the clay films are coated with gray (10YR 6/1) silt; 1 percent coarse fragments; strongly acid; gradual, smooth boundary.

B22tg—17 to 24 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, medium, prismatic structure parting to moderate, medium, subangular blocky structure; firm; few roots; medium, continuous, light brownish-gray (10YR 6/2) to grayish-brown (10YR 5/2) clay films on ped faces; thin, very patchy, gray (10YR 5/1) clay films in ped interiors; few, fine and medium, black (10YR 2/1) oxide stains; 1 percent coarse fragments; medium acid; clear, smooth boundary.

B23tg—24 to 32 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, coarse, prismatic structure; firm; medium, continuous, grayish-brown (2.5Y 5/2) clay films on ped faces; 1 percent coarse fragments; slightly acid; clear, wavy boundary.

C—32 to 73 inches, dark-brown (10YR 4/3) silty clay loam: massive; firm; 2 percent coarse fragments of siltstone, shale, and limestone; mildly alkaline and calcareous.

Thickness of the solum and depth to calcareous material ranges from 30 to 40 inches. In undisturbed areas the A1 horizon is 1 to 3 inches thick and very dark gray (10YR 3/1) to black (10YR 2/1). In these areas there is an A2 horizon that is 4 to 8 inches thick and grayish brown (10YR 5/2) or light brownish gray (10YR 6/2). The matrix of the B1 horizon is light brownish gray (2.5Y 6/2 and 10YR 6/2) and grayish brown (2.5Y 5/2). In the B2t horizon the matrix is yellowish brown (10YR 5/4), grayish brown (2/5Y 5/2), and dark yellowish brown (10YR 4/4). Clay films are grayish brown (10YR 5/2 and 2.5Y 5/2), gray (10YR 5/1), and dark gray (10YR 4/1). Average clay content of the Bt horizon ranges from 35 to 42 percent but is typically closer to 35 percent. The structure is moderate, medium or coarse, prismatic parting to weak or moderate, fine and medium, subangular blocky. The lower part of the B horizon has very patchy, thin clay films in some places. Depth to the Bt horizon ranges from 11 to 15 inches. The B1 and B21t horizons range from strongly acid to slightly acid. Reaction is less acid with increasing depth, and the lower part of the B23t horizon is commonly neutral. In the C horizon the calcium carbonate equivalent is 10 to 15 percent.

Mahoning soils are the somewhat poorly drained members of a drainage sequence that includes the moderately well drained Ellsworth soils and the poorly drained Trumbull soils. They are commonly adjacent to Ellsworth, Trumbull, Wadsworth, Caneadea, and Fitchville soils. Mahoning soils have a higher clay content in the Bt and C horizons than Wadsworth soils and lack the fragipan of those soils. They are not so clayey as Caneadea soils and contain more coarse fragments. Mahoning soils contain more clay and coarse fragments, but less silt in the B and C horizons, than the Fitchville soils.

Mahoning silt loam, 0 to 2 percent slopes (MgA).—This soil is in areas between drainageways. Most areas are more than 10 acres in size. A profile of this soil is described as representative for the series. Included in mapping, particularly in shallow drainageways and depressions, are small spots of poorly drained Trumbull soils.

Runoff is slow to ponded, and seasonal wetness is a severe limitation if this soil is used for cultivated crops. The soil can be droughty in summer if rains are not timely. Seasonal wetness and slow permeability are limitations to many nonfarm uses of this soil. Capability unit IIIw-3; woodland suitability group 2w2.

Mahoning silt loam, 2 to 6 percent slopes (MgB).—This soil is in convex areas on uplands. Most slopes are long and irregular in shape and are mostly less than 5 percent.

Included in mapping are a few spots of moderately eroded Mahoning silt loam. Also included, particularly where slopes are 4 to 6 percent, are spots of better drained Ellsworth soils. A few areas of soils where sandstone bedrock occurs between depths of 4 and 6 feet also are included.

Runoff is medium to rapid. Where slopes are long, internal water moves laterally in places and tends to collect in low spots. Seasonal wetness is a severe limitation if this soil is used for cultivated crops. Erosion is a hazard, especially if the soil is used for row crops. Seasonal wetness and slow permeability are limitations to many nonfarm uses of this soil. Capability unit IIIw-3; woodland suitability group 2w2.

Mahoning silt loam, sandstone substratum, 2 to 6 percent slopes (MlB).—This soil is in areas where sandstone bedrock is between a depth of 40 ond 60 inches. Most of these areas are in Twinsburg Township. Slopes are less than 4 percent in most places. This soil commonly has no calcareous soil material between the subsoil and bedrock. Included in mapping are areas of soils where the depth to sandstone is more than 60 inches. Seasonal wetness is a severe limitation if the soil is used for cultivated crops. Seasonal wetness and slow permeability are limitations to many nonfarm uses of this soil. Capability unit IIIw-3; woodland suitability group 2w2.

Mahoning-Urban land complex (Mn).—This mapping unit consists of nearly level to undulating areas where much of the original Mahoning soils has been disturbed, removed, or covered by grading and digging. Most of this mapping unit is used for urban or industrial development. Borrow or fill areas make up 50 to 75 percent of the mapping unit, but the soils are undisturbed in undeveloped lots, in the back part of developed lots, and in small wooded areas.

Fill areas typically consist of about 1 to 3 feet of fill material overlying undisturbed Mahoning soils or inclusions of lower lying, wetter Trumbull soils. The fill material is sticky silty clay loam from the subsoil of Mahoning soils or, in some places, limy glacial till material. In borrow areas the substratum or subsoil of these soils is exposed.

The surface layer in graded areas commonly has a low organic-matter content and poor tilth. The range of moisture content suitable for optimum tillage is narrow. The surface layer is subject to crusting after rains. Seasonal wetness is a limitation, particularly where grading has made depressional or bowl-shaped areas. The hazard of erosion is severe, particularly if the soil is sloping and is bare of vegetation during construction. Gullying and

sedimentation commonly occur during construction unless conservation practices are used. Capability unit not assigned; woodland suitability group 2w2.

Mitiwanga Series

The Mitiwanga series consists of gently sloping, somewhat poorly drained soils on uplands. These soils formed in glacial till or outwash deposits or in a mixture of these. They are moderately deep to weathered sandstone and shale.

In a representative profile of a Mitiwanga soil that has been cultivated, the plow layer is dark grayish-brown silt loam about 8 inches thick. The upper part of the subsoil, to a depth of 13 inches, is friable, mottled, light olive-brown silt loam. Below this, to a depth of 38 inches, the subsoil is mottled, yellowish-brown and dark yellowish-brown, friable silt loam. Fine-grained sandstone interbedded with shale is at a depth of 38 inches.

Mitiwanga soils have moderate permeability. They have a water table near the surface late in winter and in spring. The rooting zone in these soils is moderately deep and strongly acid or very strongly acid, and available moisture capacity is medium to low.

Most areas of Mitiwanga soils are cleared. Some areas are cultivated, and some are in pasture. The main crops are corn and wheat. Artificial drainage is beneficial to crops.

Representative profile of Mitiwanga silt loam, 2 to 6 percent slopes, in a cultivated field in Sagamore Hills Township, T. 5 N., R. 11 W., 1½ miles west of Northfield Center, 2,200 feet north of State Route 82, and 125 feet east of railroad:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; many roots; 5 percent coarse fragments; strongly acid; abrupt, smooth boundary.

B1—8 to 13 inches, light olive-brown (2.5Y 5/4) silt loam; common, medium, olive-gray (5Y 5/2) mottles and a few, fine, dark yellowish-brown (10YR 4/4) mottles; moderate, medium, subangular blocky structure; friable; common roots; peds coated olive gray (5Y 5/2); 3 percent coarse fragments; strongly acid; clear, smooth boundary.

B21t—13 to 19 inches, yellowish-brown (10YR 5/4) silt loam; common, medium, dark-brown (7.5YR 4/4) mottles; moderate, medium and fine, subangular blocky structure; friable; few roots; thin, patchy, grayish-brown (2.5Y 5/2) clay films on ped faces; 5 percent coarse fragments, mostly angular sandstone fragments; very strongly acid; clear, smooth boundary.

B22t—19 to 24 inches, dark yellowish-brown (10YR 4/4) silt loam; many, medium, grayish-brown (2.5Y 5/2) mottles; moderate, coarse, subangular blocky structure; friable; thin, continuous, gray (N 6/0) clay films on ped faces; 5 percent coarse fragments, mostly angular sandstone fragments; strongly acid; clear, smooth boundary.

B23t—24 to 38 inches, dark yellowish-brown (10YR 4/4) silt loam; many, medium, olive-gray (5Y 5/2) mottles; moderate, coarse, subangular blocky structure; friable; thin, continuous, gray (N 6/0) clay films on vertical ped faces, thin, patchy, gray (N 6/0) clay films on on horizontal faces; upper 7 inches is 10 percent coarse fragments, but the content of coarse fragments increases with depth to about 50 to 60 percent in the lower 2 inches; slightly acid; abrupt smooth boundary.

R—38 to 50 inches, olive-gray (5Y 5/2) sandstone; the upper 12 inches is fractured and partially weathered.

The depth to sandstone bedrock ranges from 20 to 40 inches. The lower part of the B horizon is slightly acid to strongly acid and has a base saturation above 35 percent. The interiors of peds in the B horizon are mottled, but the matrix has a hue of 10YR, value of 4 or 5, and chroma of 2, 3 or 4. The dominant colors of the ped exteriors have a value of 4 or 5 and chroma of 2. The B horizon is loam, silt loam, and light silty clay loam.

Mitiwanga soils are the somewhat poorly drained members of a drainage sequence that includes the well-drained Loudonville soils. They are commonly adjacent to Fitchville, Wadsworth, and Loudonville soils. Mitiwanga soils are shallower than Fitchville and Wadsworth soils, which do not have bedrock within a depth of 40 inches. They are more mottled and more poorly drained than Loudonville soils.

Mitiwanga silt loam, 2 to 6 percent slopes (MtB).—This soil is on uplands, mainly in Sagamore Hills Township. Most areas are irregular in shape and are 3 to 7 acres in size. The surface layer is as much as 10 percent sandstone fragments in places. The soil is saturated with water in winter and early in spring, but it is droughty in summer unless rainfall is timely.

Runoff is medium, and erosion is a hazard if the soil is bare of vegetation. Wetness early in spring, droughtiness in summer, and a moderate depth to bedrock limit the use of the soil for cultivated crops. Moderate depth to bedrock and a seasonal water table are limitations to many nonfarm uses. Capability unit IIIw-3; woodland suitability group 3w1.

Olmsted Series

The Olmsted series consists of nearly level to slightly depressional, dark-colored, very poorly drained soils. These soils formed in loamy outwash of Wisconsin age overlying sandy and gravelly outwash. They are on outwash terraces throughout the county.

In a representative profile of an Olmsted soil that has been cultivated, the plow layer is black loam 8 inches thick. The upper part of the subsoil, to a depth of 13 inches, is gray loam. Below this, to a depth of 29 inches, the subsoil is gray sandy loam. The lower part of the subsoil is dark-gray sandy clay loam that extends to a depth of 32 inches. The underlying material, below a depth of 32 inches and to a depth of 60 inches or more, consists of layers of dark-gray, yellowish-red, and brown sandy loam, gravelly sandy loam, and sandy clay loam.

Olmsted soils have a high water table in winter, in spring, and early in summer. Permeability is moderate to moderately rapid. The rooting zone in these soils is moderately deep to deep in drained areas and in summer when the water table is low. Olmsted soils are very strongly acid in the upper 21 inches. Their available moisture capacity is medium in the rooting zone.

Most areas of Olmsted soils are not farmed. In cultivated areas the main crops are corn, wheat, and vegetables. Artificial drainage is beneficial to crops.

Representative profile of Olmsted loam, in a cultivated field in Copley Township, T. 2 N., R. 12 W., 1,500 feet north of Wright Avenue, 2,000 feet south of State Route 162, and 2,100 feet south of White Pond; (sample No. ST-7 in table 10):

Ap—0 to 8 inches, black (10YR 2/1) loam; weak, medium, granular structure; friable; many roots; very strongly acid; abrupt, smooth boundary.

B1g—8 to 13 inches, gray (5Y 6/1) loam; common, medium, prominent, strong-brown (7.5YR 5/8) mottles in old root channels; weak, medium, subangular blocky structure; firm; common roots; very strongly acid; clear, smooth boundary.

B21g—13 to 21 inches, gray (5Y 5/1) sandy loam; many, fine, prominent, strong-brown (7.5YR 5/6) mottles; weak, medium, subangular blocky structure; firm; few roots; 5 percent gravel; very strongly acid; clear, smooth boundary.

B22tg—21 to 29 inches, gray (5Y 5/1) sandy loam; many, medium, prominent, strong-brown (7.5YR 5/8) mottles; weak, medium, subangular blocky structure; friable; thin patchy clay films and clay bridging sand grains; 5 percent gravel; strongly acid; clear, smooth boundary.

B23tg—29 to 32 inches, dark-gray (10YR 4/1) sandy clay loam; common, medium, prominent, yellowish-red (5YR 4/8) mottles; massive; friable; thin, patchy, dark-gray (10YR 4/1) clay films and bridging sand grains; strongly acid; abrupt, smooth boundary.

B3—32 to 34 inches, strong-brown (7.5YR 5/6) sandy loam; massive; firm; strongly acid; abrupt, smooth boundary.

IIC—34 to 41 inches, dark-gray (N 4/0) gravelly sandy loam; many, medium, prominent, yellowish-red (5YR 4/6) mottles; massive; friable; 25 percent gravel; strongly acid; clear, smooth boundary.

IIIC—41 to 60 inches, yellowish-red (5YR 4/6) and brown (7.5YR 4/2) sandy clay loam; massive; firable; medium acid; clear, smooth boundary.

The solum ranges from 27 to 40 inches in thickness. The A horizon ranges from 6 to 10 inches in thickness. The Ap horizon is black (10YR 2/1) or very dark gray (10YR 3/1). The A horizon ranges from very strongly acid to medium acid. The Btg horizon is sandy loam, sandy clay loam, and loam and is 0 to 10 percent gravel. The upper 20 inches of the Bt horizon has a weighted average clay content that ranges from 18 to 27 percent. The matrix of the mottled Btg horizon typically has a hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 0 to 2 but generally of 0 to 1. Mottles that have hues of 5YR, 7.5YR, and 10YR, value of 4 to 6, and chroma of 4 to 8 are common and are present in 10 to 40 percent of the mass. The Btg horizon ranges from strongly acid to slightly acid.

Olmsted soils are the very poorly drained members of a drainage sequence that includes the well drained Chili soils, the moderately well drained Bogart soils, the somewhat poorly drained Jimtown soils, and the poorly drained Damascus soils. They are commonly adjacent to Damascus, Carlisle, and Luray soils. Olmsted soils have a darker colored A horizon than the Damascus soils. They are mineral soils in contrast to the organic Carlisle soils. Olmsted soils are coarser textured throughout the profile than the very poorly drained Luray soils.

Olmsted loam (Od).—This nearly level soil is on outwash terraces. Most areas range from 2 to 20 acres in size. Included in mapping are small areas of Luray and Linwood soils. These do not drain so readily as the Olmsted soils. Also included, particularly in old drainage channels, are a few small spots of Sloan soils.

Runoff is slow to ponded, and wetness is a moderate limitation to farming. A seasonal high water table is a limitation to most nonfarm uses of this soil. Capability unit IIw-3; woodland suitability group 2w1.

Orrville Series

The Orrville series consists of nearly level, somewhat poorly drained soils. These soils formed in loamy alluvium on flood plains throughout the county.

In a representative profile of an Orville soil in a wooded area, the surface layer is very dark grayish-brown silt loam about 6 inches thick. The upper part of the subsoil, to a depth of 13 inches, is grayish-brown silt loam. The lower part of the subsoil, to a depth of 30 inches, is dark yellowish-brown silt loam. The underlying material, to a depth of 60 inches or more, is grayish-brown silt loam.

Orrville soils are subject to occasional flooding. The water table is near the surface late in winter and in spring. These soils are moderately permeable. The rooting zone is deep in drained areas and in summer when the water table is low. Orrville soils have a high available moisture capacity and are medium acid to strongly acid in the rooting zone.

Orrville soils are mainly wooded. Because they lack adequate drainage and flood protection, few areas are cultivated.

Representative profile of Orrville silt loam, in a wooded area in Twinsburg Township, T. 5 N., R. 10 W., 400 feet south of Old Mill Road and 150 feet west of Tinkers Creek:

A1—0 to 6 inches, very dark grayish-brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) rubbed; moderate, medium and coarse, granular structure; friable; many roots; medium acid; clear, wavy boundary.

B1g—6 to 13 inches, grayish-brown (2.5Y 5/2) silt loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium and coarse, subangular blocky structure; friable; common roots; common black (10 YR 2/1) oxide concretions; strongly acid; clear, smooth boundary.

B2g—13 to 30 inches, dark yellowish-brown (10YR 4/4) silt loam; many, medium, distinct, grayish-brown (2.5Y 5/2) and yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; friable; common roots; grayish-brown (2.5Y 5/2) ped coatings; a few black (10YR 2/1) oxide concretions; medium acid; clear, smooth boundary.

Cg—30 to 60 inches, grayish-brown (2.5Y 5/2) silt loam; many, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; massive; friable; few roots; few black (10YR 2/1) oxide stains; slightly acid.

The upper part of the solum is strongly acid to slightly acid, and the lower part is typically slightly acid to medium acid. The B horizon is dominantly silt loam but has layers of sandy loam, loam, or light silty clay loam. The horizon has weak to moderate, medium and coarse, subangular blocky structure. The matrix of the B2g horizon has a hue of 2.5YR or 10YR, chroma of 4 to 6, and value of 4 or 5. The B horizon has many, distinct or prominent mottles that have a value of 4 to 6 and chroma of 2 to 8. The C horizon is massive and stratified, and it has layers of silt loam, loam, and sandy loam.

Orrville soils are the somewhat poorly drained members of a drainage sequence that includes the well drained Chagrin soils, moderately well drained Lobdell soils, poorly drained Holly soils, and very poorly drained Sloan soils. They are not so well drained as the Lobdell and Chagrin soils, which are in adjacent higher areas of the flood plain. Orrville soils are better drained than Holly and Sloan soils, which are in nearby depressions and abandoned stream channels.

Orrville silt loam (Or).—This nearly level soil is on narrow flood plains and in narrow strips on larger flood plains. Areas of this soil generally are less than 50 acres in size. Included in mapping are spots of poorly drained Holly soils in low areas and in meandering channels.

Runoff is slow, and wetness is a moderate limitation to farming. Susceptibility to flooding and seasonal wetness are limitations to most nonfarm uses of this soil. Capability unit IIw-1; woodland suitability group 2w1.

Oshtemo Series

The Oshtemo series consists of deep, well-drained, nearly level to sloping soils that formed in loamy and sandy outwash of Wisconsin age. These soils are on outwash terraces and kames.

In a representative profile of an Oshtemo soil that has been cultivated, the plow layer is dark-brown sandy loam about 9 inches thick. The next layer is yellowish-brown sandy loam about 7 inches thick. The subsoil extends to a depth of 42 inches. The upper 8 inches is dark-brown light sandy loam; the next 11 inches is brown loamy coarse sand; and the lower 7 inches is dark-brown loamy coarse sand. Below a depth of 42 inches and extending to a depth of 75 inches or more, the underlying material is brown sand.

Oshtemo soils have moderately rapid permeability in the subsoil and rapid permeability in the underlying sand. They warm up and dry out early in spring. The rooting zone in these soils is deep, and the available moisture capacity is low. Where the soils have not been limed, they are medium acid to strongly acid.

About half the acreage is used for crops, and the other half is wooded. Some cleared areas are not presently cultivated. The main crops grown are corn, wheat, and grass-legume meadow.

Representative profile of Oshtemo sandy loam, 2 to 6 percent slopes, in a cultivated field in NW¼SE¼ sec. 32, Franklin Township, 1,500 feet south of Clinton and 425 feet east of 83rd Division Memorial Highway; (sample No. ST–21 in table 10):

Ap—0 to 9 inches, dark-brown (10YR 3/3) sandy loam; moderate, medium and fine, granular structure; friable; many roots; 2 percent pebbles; slightly acid; abrupt, smooth boundary.

A&B—9 to 16 inches, yellowish-brown (10YR 5/4) sandy loam; 30 percent dark yellowish-brown (10YR 4/4) inclusions; weak, medium, subangular blocky structure; firm; many roots; thin very patchy clay films in lower part; many fine pores and worm channels; 2 percent pebbles; slightly acid; clear, smooth boundary.

B21t—16 to 24 inches, dark-brown (7.5 YR 4/4) light sandy loam; weak, medium, subangular blocky structure; firm; few roots; thin, patchy, dark-brown (7.5YR 4/2) clay films on ped faces and bridging sand grains; a few, fine, black (N 2/0) oxide stains; few roots; 5 percent pebbles; medium acid; clear, wavy boundary.

B22t—24 to 35 inches, brown (7.5YR 5/4) loamy coarse sand; single grain; very friable; irregular patches of dark-brown (7.5YR 4/4) clay films coating and bridging sand grains; 2 percent pebbles; medium acid; clear, wavy boundary.

B23t—35 to 42 inches, dark-brown (7.5YR 4/4) loamy coarse sand; single grain; very friable; thin patchy clay films bridging and coating sand grains; 5 percent pebbles; strongly acid; clear, wavy boundary.

C1—42 to 53 inches, brown (7.5YR 5/4) coarse sand; single grain; loose; thin very patchy clay films coating sand grains; 2 percent pebbles; medium acid; clear, smooth boundary.

C2—53 to 75 inches, brown (10YR 4/3) coarse sand; single grain; loose; 15 percent pebbles; slightly acid; clear, smooth boundary.

The solum ranges from 35 to 45 inches in thickness. It generally ranges from medium acid to strongly acid unless the soil has been limed. The gravel content in the solum ranges from less than 1 percent to 30 percent. The Ap horizon is dark brown (10YR 3/3) and dark grayish brown (10YR 4/2). A very dark grayish brown (10YR 3/2) A1 horizon, 1 to 4 inches thick, occurs in places that have not been cultivated. The A horizon is brown (10YR 5/3) to yellowish brown (10YR 5/4). An A&B horizon is present in some places. The Bt horizon has hues of 7.5YR and 10YR, value of 4 or 5, and chroma of 3 or 4. The texture is sandy loam, gravelly sandy loam, and loamy sand. The weighted average clay content is less than 18 percent. In the lower part of the Bt horizon, clay films and clay bridging are not well expressed in some places.

In Summit County the Oshtemo soils dominantly have a darker colored A horizon and have a higher sand content in the solum than defined for the series, but this does not alter their usefulness or behavior.

Oshtemo soils are commonly near the Conotton and Chili soils. They are less gravelly than the Conotton soils. Oshtemo soils are similar to Chili soils but have less gravel and clay in the B horizon.

Oshtemo sandy loam, 0 to 2 percent slopes (OsA).—This soil is on terraces. Most areas are less than 10 acres in size, but a few areas, particularly in the vicinity of the village of Clinton, are more than 10 acres. Included in mapping are small spots of more gravelly Chili soils and areas of Oshtemo soils that have a darker colored surface layer than is typical for these soils.

Runoff is slow, and water enters this soil readily. Summer droughtiness is the major limitation to the use of this soil for farming. There are very few limitations to most nonfarm uses of this soil. Capability unit IIs–1; woodland suitability group 3s1.

Oshtemo sandy loam, 2 to 6 percent slopes (OsB).—This soil is on terraces. Slopes are commonly short and irregular. A profile of this soil is described as representative for the series. Included in mapping are a few spots of more gravelly Chili soils and small areas of soils that have slopes of more than 6 percent.

Runoff is slow, but erosion is a moderate hazard if the soil is used for cultivated crops. This soil is droughty in summer unless rainfall is timely. Slope is the major limitation of this soil for many nonfarm uses. Capability unit IIe–1; woodland suitability group 3s1.

Oshtemo sandy loam, 6 to 12 percent slopes (OsC).—This soil is on rolling kames and terrace breaks. Slopes are generally short and irregular. Most areas are less than 10 acres in size. This soil commonly adjoins areas of the more gravelly Chili and Conotton soils. Included in mapping are small spots of Chili and Conotton soils and areas of Oshtemo soils that have a more sandy surface layer than is typical for these soils.

Runoff is medium, and erosion is a severe hazard if this soil is used for cultivated crops. The soil is droughty in summer. Slope is a limitation to many nonfarm uses of this soil. Capability unit IIIe–1; woodland suitability group 3s1.

Ravenna Series

The Ravenna series consists of somewhat poorly drained, nearly level to gently sloping soils that have a fragipan. These soils formed in loam or silt loam glacial till of Wisconsin age. They are on uplands in the southern half of the county.

In a representative profile of a Ravenna soil that has been cultivated, the plow layer is dark grayish-brown silt loam about 7 inches thick. The upper part of the subsoil, to a depth of 17 inches, is firm, yellowish-brown and brown silt loam. Below this, to a depth of 23 inches, the subsoil is firm, dark yellowish-brown silty clay loam. The lower part of the subsoil, between depths of 23 and 51 inches, is a dense, compact, brown loam fragipan. Be-

low the fragipan, to a depth of 90 inches or more, the underlying material is brown loam glacial till. The till is compact and slightly acid to medium acid and contains pebbles and fragments of sandstone and siltstone.

Ravenna soils have moderate permeability above the fragipan and slow permeability in the fragipan and in the underlying glacial till. They have a perched water table above the fragipan late in winter and in spring. The rooting zone in these soils is moderately deep, and the available moisture capacity is medium. Where the soils have not been limed, they are medium acid to very strongly acid above the fragipan.

Most of the acreage is cultivated, but some areas are in pasture and some are wooded. The main crops grown are corn, wheat, and grass-legume meadow. Artificial drainage is beneficial to crops.

Representative profile of Ravenna silt loam, 0 to 2 percent slopes, in a cultivated field in Coventry Township within city limits of Barberton, T. 1 N., R. 11 W., 2,500 feet east of State Route 619 and 800 feet north of Lockwood Road:

Ap—0 to 7 inches, dark grayish-brown (2.5Y 4/2) silt loam; moderate, medium, granular structure; friable; neutral; abrupt, smooth boundary.

B1—7 to 12 inches, yellowish-brown (10YR 5/4) silt loam; many, fine, distinct, grayish-brown (2.5Y 5/2) mottles; weak, medium, subangular blocky structure; firm; grayish brown (2.5Y 5/2) ped coatings; about 1 percent coarse fragments; neutral; clear, smooth boundary.

B21t—12 to 17 inches, brown (10YR 4/3) heavy silt loam; common, fine, distinct, gray (5Y 6/1) mottles; moderate, medium, prismatic structure; firm; thin, patchy, gray (10YR 5/1) clay films on vertical ped faces and in ped interiors; about 2 percent coarse fragments; medium acid; clear, smooth boundary.

B22t—17 to 23 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; common, fine, distinct, gray (10YR 6/1) mottles; moderate, medium, prismatic structure; firm; thin, patchy, gray (5Y 5/1) clay films mainly on vertical ped faces and in ped interiors; about 2 percent coarse fragments; very strongly acid; clear, wavy boundary.

Bx1—23 to 31 inches, brown (10YR 4/3) heavy loam; common, fine, distinct, light-gray (10YR 6/1) mottles; weak, coarse, prismatic structure; very firm and brittle; medium, continuous, dark-gray (10YR 4/1) clay films on vertical faces; a few black oxide stains in ped interiors; about 2 percent coarse fragments; very strongly acid; gradual, wavy boundary.

Bx2—31 to 43 inches, brown (10YR 4/3) loam; a few, fine, distinct, light-gray (10YR 6/1) mottles; weak, coarse, prismatic structure; very firm, brittle; thin, patchy, dark-gray (10YR 4/1) clay films on vertical faces; about 3 percent coarse fragments; a few black oxide stains in ped interiors; strongly acid; gradual, wavy boundary.

Bx3—43 to 51 inches, brown (10YR 4/3) loam; weak, thick, platy structure; firm with slight brittleness; thin light-gray (5Y 6/1) streaks vertically oriented; common black oxide stains; about 3 percent coarse fragments; strongly acid; gradual. wavy boundary.

C1—51 to 72 inches, brown (10YR 4/3) loam; common, medium, light-gray (10YR 6/1) mottles; weak, thick, platy structure; firm; about 3 percent coarse fragments; medium acid; gradual, smooth boundary.

C2—72 to 90 inches, brown (10YR 4/3) loam; weak, thick, platy structure to massive; friable; about 3 percent coarse fragments; slightly acid.

The solum ranges from 50 to 66 inches in thickness. In uncultivated areas the A1 horizon is very dark gray (10YR 3/1) or very dark grayish brown (10YR 3/2) and 2 to 5 inches thick. A silt mantle, up to 20 inches thick, is present in some places. An A2 horizon, where present, ranges from 3 to 6 inches in thickness and is dark yellowish brown (10YR 4/4) or brown (10YR 5/3). The Ap horizon is dark grayish brown (10YR 4/2 or 2.5Y 4/2) silt loam or loam.

The Bt horizon above the fragipan ranges from 9 to 12 inches in thickness. It typically is firm loam, silt loam, or silty clay loam, and its matrix has hues of 10YR and 2.5Y, value of 4 or 5, and chroma of 3, 4, or 5. It generally is mottled in chromas of 2 or less, and the ped surfaces dominantly are light brownish gray (2.5Y 6/2), gray (5Y 5/1 to 6/1), and dark gray (5Y 4/1).

The Bx horizon is at a depth ranging from 21 to 26 inches. Ped interiors have hues of 10YR and 2.5Y, value of 3 or 4, and dominant chroma typically of 4. The polygons are coated gray (10YR 5/1, 6/1; 5Y 5/1) or dark gray (10YR 4/1). The platy surfaces are covered with thin clay films and splotches of black (10YR 2/1) oxide stains. In some places there are thin strata of light clay loam or light silty clay loam that is as much as 29 or 30 percent clay. The thickness ranges from 26 to 40 inches. The solum is typically strongly acid but ranges from very strongly acid to medium acid unless it has been limed. The C horizon is loam or silt loam.

Ravenna soils are the somewhat poorly drained members of a drainage sequence that includes the well drained Wooster soils, the moderately well drained Canfield soils, and the poorly drained Frenchtown soils. They are commonly adjacent to their drainage associates and to Jimtown, Sebring, and Fitchville soils. Ravenna soils differ from Jimtown, Sebring, and Fitchville soils because they have a Bx horizon and formed in a different kind of material.

Ravenna silt loam, 0 to 2 percent slopes (ReA).—This soil is on upland flats that vary in size. A profile of this soil is described as representative for the series.

Included in mapping, particularly in shallow drainageways and depressions, are small spots of poorly drained Frenchtown soils.

Runoff is slow, and runoff from surrounding higher areas accumulate on this soil. Seasonal wetness is a moderate limitation if this soil is used for cultivated crops. The surface layer is subject to crusting. Droughtiness in midsummer is not so common on this soil as on more sloping Ravenna soils. Seasonal wetness and slow permeability are limitations to many nonfarm uses of this soil. Capability unit IIw–4; woodland suitability group 2w2.

Ravenna silt loam, 2 to 6 percent slopes (ReB).—This soil is in areas near the heads of drainageways or on uplands. Slopes are long in areas in uplands. Areas range from 2 to 50 acres in size. Included in mapping are small knolls of the better drained Canfield soils. Where slopes are long, the lateral movement of water on top of the fragipan causes downslope seeps in periods of heavy rainfall.

Seasonal wetness is a moderate limitation if this soil is used for cultivated crops. Runoff is medium, and erosion is a hazard. The surface is subject to crusting. Seasonal wetness, slope, and slow permeability are limitations to some nonfarm uses of this soil. Capability unit IIw–4; woodland suitability group 2w2.

Ravenna-Urban land complex (Rn).—This mapping unit consists of nearly level to gently sloping areas where much of the original Ravenna soils has been destroyed or covered by grading and digging. Most areas are used for urban or industrial development. Borrow or fill areas make up 50 to 75 percent of the mapping unit, but the soils are undisturbed in undeveloped lots, in the back part of developed lots; and in small wooded areas.

Fill areas typically consist of about 1 to 3 feet of fill material overlying undisturbed Ravenna soils or inclusions of wetter, lower lying Frenchtown soils. The fill is loamy material from the subsoil and substratum of

Ravenna soils. In borrow areas the substratum or subsoil of these soils is exposed.

The surface layer in graded areas commonly is low in organic-matter content and fertility. This layer tends to become hard as it dries. Seasonal wetness is a limitation, particularly where grading has made depressional or bowl-shaped areas. Erosion is a hazard in construction areas where the vegetation has been removed. Erosion losses, siltation, and sedimentation are high in these areas unless erosion control practices are used. Capability unit not asigned; woodland suitability group 2w2.

Rittman Series

The Rittman series consists of gently sloping to steep, moderately well drained soils that have a fragipan. These soils formed in clay loam or silt loam glacial till of Wisconsin age. They are on uplands in the northern part of the county.

In a representative profile of a Rittman soil that has been cultivated, the plow layer is dark grayish-brown silt loam about 6 inches thick. The upper part of the subsoil, to a depth of 13 inches, is firm, yellowish-brown silt loam. Below this, to a depth of 20 inches, it is firm, dark yellowish-brown clay loam. The lower part of the subsoil, between depths of 20 and 46 inches, is a compact, dark yellowish-brown clay loam fragipan. Below this fragipan, between depths of 46 and 66 inches or more, the underlying material is dark-brown silty clay loam glacial till. This till material is firm and limy, and it contains pebbles and fragments of shale and siltstone.

Rittman soils have slow permeability in the fragipan and in the underlying glacial till. They have a perched water table within 2 feet of the surface during wet periods, generally in winter and early in spring. The rooting zone in these soils is moderately deep and very strongly acid, and available moisture capacity is medium.

Most areas of Rittman soils have been cleared, but few areas are presently farmed. The main crops are wheat, corn, and grass-legume meadow.

Representative profile of Rittman silt loam, 2 to 6 percent slopes, in Stow village, one-half mile northeast of Wyoga Lake, 2,000 feet east of Allen Road, and 50 feet south of gas pipeline:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine and medium, granular structure; friable; many roots; very strongly acid; abrupt, smooth boundary.

B1—6 to 13 inches, yellowish-brown (10YR 5/4) silt loam; moderate, medium, subangular blocky structure; firm; common roots; brown (10YR 5/3) ped coatings; 2 percent coarse fragments; very strongly acid; clear, smooth boundary.

B2t—13 to 20 inches, dark yellowish-brown (10YR 4/4) clay loam; common, fine, distinct, gray (5Y 6/1) mottles; moderate, medium, subangular blocky structure; firm; few roots; thin, patchy, grayish-brown (2.5Y 5/2) clay films on horizontal and vertical ped faces; 2 percent coarse fragments; very strongly acid; clear, wavy boundary.

Bx1—20 to 32 inches, dark yellowish-brown (10YR 4/4) clay loam; common, medium, distinct, gray (10YR 5/1) mottles; moderate, coarse, prismatic structure; very firm and brittle; medium, continuous, grayish-brown (2.5Y 5/2) clay films on vertical ped faces; thin, patchy, dark-gray (10YR 4/1) clay films in ped interiors; a few black (10YR 2/1) oxide stains; strongly acid; gradual, wavy boundary.

Bx2—32 to 46 inches, dark yellowish-brown (10YR 4/4) clay loam; common, medium, distinct, strong-brown (7.5YR 5/8) mottles; weak, very coarse, prismatic structure; medium, patchy, dark grayish-brown (10YR 4/2) clay films on vertical ped faces; 2 percent coarse fragments; slightly acid; clear, wavy boundary.

C—46 to 66 inches, dark-brown (10YR 4/3) silty clay loam; massive; firm; gray (5Y 5/1) clay films on fracture faces; about 2 percent coarse fragments; mildly alkaline and calcareous; gradual, smooth boundary.

In undisturbed soils the A1 horizon is very dark grayish-brown (10YR 3/2) silt loam 1 to 3 inches thick, and the A2 horizon is brown (10YR 5/3) silt loam 4 to 7 inches thick. The Bt horizon above the fragipan ranges from 7 to 12 inches in thickness. It is clay loam or silty clay loam, and the content of clay ranges from 27 to 35 percent. Dominant colors of the matrix have a hue of 10YR or 7.5R, value of 4 or 5, and chroma of 3, 4, or 5. Typically, mottles having a chroma of 2 or less occur just above the fragipan. The fragipan occurs at a depth ranging from 20 to 26 inches, and it ranges from 15 to 26 inches in thickness. The matrix is dark brown (10YR 4/3) or dark yellowish brown (10YR 4/4). The structure is coarse or very coarse prismatic parting to weak angular blocky or platy. Clay films on ped faces are grayish brown (2.5Y 5/2), dark grayish brown (10YR 4/2), dark gray (10YR 4/1), and gray (10YR 5/1). Medium to thick, vertical seams of gray clay occur on the polygon or prism faces. The color between the gray clay films and the matrix of the polygons is yellowish brown (10YR 5/6 and 5/8). The fragipan is heavy loam or silt loam, light clay loam, or silty clay loam. The reaction typically is very strongly or strongly acid in the fragipan but is less acid with increasing depth. Depth to calcareous material ranges from 40 to 60 inches. The C horizon is loam, silt loam, clay loam, or silty clay loam. Coarse fragments as much as 3 inches in diameter commonly are present, but in a few places they are absent.

Rittman soils are the moderately well drained members of a drainage sequence that includes the somewhat poorly drained Wadsworth soils. They commonly are adjacent to Wadsworth, Ellsworth, Mahoning, Glenford, and Fitchville soils.

Rittman soils have a lower clay content in the B horizon and in the underlying glacial till than Ellsworth and Mahoning soils. They have a Bx horizon that is lacking in Ellsworth, Mahoning, Glenford, and Fitchville soils. Rittman soils contain more sand and coarse fragments and less silt than Glenford and Fitchville soils.

Rittman silt loam, 2 to 6 percent slopes (RsB).—This soil is on knolls and side slopes along drainageways. Most areas range from 10 to 100 acres in size. A profile of this soil is described as representative for the series. Where slopes are long, seep areas are common.

Included in mapping are small areas of the Canfield soils. Also included, particularly in less sloping areas where water from surrounding slopes has accumulated, are small spots of somewhat poorly drained Wadsworth soils. Other inclusions are small spots of eroded soils on the upper part of slopes where the plow layer is a mixture of the original surface layer and some of the subsoil. Areas of less sloping Rittman soils that have a silt deposit as much as 2 feet thick also are included. These less sloping soils have a surface layer that contains fewer coarse fragments than typical, and they are slightly deeper over the fragipan.

Runoff is medium, and erosion is a moderate hazard if this soil is used for cultivated crops. Surface crusting is a limitation in cultivated areas. Slow permeability and slope are limitations to many nonfarm uses of this soil. Capability unit IIe-3; woodland suitability group 2w2.

Rittman silt loam, 6 to 12 percent slopes (RsC).—This soil is generally along drainageways. Included in mapping, on the less sloping parts of long slopes, are small areas of somewhat poorly drained Wadsworth soils.

Runoff is rapid, and surface crusting is a concern in cultivated areas. Erosion is a severe hazard if this soil is used for cultivated crops. Slow permeability and slope are limitations to many nonfarm uses of this soil. Capability unit IIIe-3; woodland suitability group 2w2.

Rittman silt loam, 6 to 12 percent slopes, moderately eroded (RsC2).—This soil is on hillsides along drainageways and on moraines on uplands. The present surface layer of this soil is a mixture of the original surface layer and some of the yellowish-brown subsoil. Depth to the fragipan is commonly less than 18 inches. Because of erosion the plow layer is low in organic-matter content. The rooting zone is shallow, and the available moisture capacity is less than that of uneroded Rittman soils. Small areas, where the surface layer is mainly yellowish-brown subsoil material, typically have shallow gullies. Coarse fragments as much as 2 inches in diameter are common in the surface layer. Included in mapping are wet spots in shallow drainageways and small areas of Canfield soils.

Surface crusting is severe in cultivated areas of this soil. Runoff is rapid, and erosion is a severe hazard if this soil is used for cultivated crops. Slow permeability and slope are limitations to many nonfarm uses. Capability unit IIIe-3; woodland suitability group 2w2.

Rittman silt loam, 12 to 18 percent slopes (RsD).—This soil is on hillsides along drainageways on uplands. These drainageways are commonly joined at right angles by shallow drainageways that extend into the uplands.

Runoff is rapid, and erosion is a very severe hazard if this soil is used for cultivated crops. Slope and slow permeability are limitations to many nonfarm uses of this soil. Capability unit IVe-2; woodland suitability group 2w2.

Rittman silt loam, 12 to 18 percent slopes, moderately eroded (RsD2).—This soil is on irregularly shaped hillsides that commonly have shallow waterways and draws. In most areas more than half of the original surface layer has been removed through erosion. In a few areas the present surface layer is mostly yellowish-brown subsoil, and the fragipan is near the surface. In these eroded areas the soil is much less productive than less eroded Rittman soils.

Runoff is rapid, and erosion is a severe hazard if the soil is cultivated. Slope and slow permeability are limitations to most nonfarm uses of this soil. Capability unit IVe-2; woodland suitability group 2w2.

Rittman silt loam, 18 to 25 percent slopes, moderately eroded (RsE2).—This soil is on valley sides and in upland areas that have a pronounced, irregular and hilly topography. It has a profile similar to the one described as representative for the series, except that the fragipan is not so distinct. The present surface layer is a mixture of the original surface layer and some of the yellowish-brown subsoil. Included in mapping are areas of a well-drained soil that has a browner subsoil than this Rittman soil, and areas of soils that are only slightly eroded.

Runoff is very rapid because the slopes are steep. Erosion is a severe hazard unless a thick plant cover is maintained. Slope is the dominant limitation to most nonfarm uses of this soil. Capability unit VIe-2; woodland suitability group 2w2.

Rittman silt loam, sandstone substratum, 2 to 6 percent slopes (RtB).—This soil has a profile similar to the one described as representative for the series, except that it is underlain by sandstone bedrock at a depth of 40 to 60 inches. Included in mapping are areas of soils where the depth to bedrock is more than 60 inches.

Erosion is a moderate hazard if this soil is used for cultivated crops. Limited depth to bedrock and slow permeability are limitations to some nonfarm uses. Capability unit IIe-3; woodland suitability group 2w2.

Rittman silt loam, sandstone substratum, 6 to 12 percent slopes (RtC).—This soil has a profile similar to the one described as representative for the series, except that it is underlain by sandstone bedrock at a depth of 40 to 60 inches. Included in mapping are areas of soils where the depth to bedrock is more than 60 inches. Also included are small areas of Loudonville soils and areas of soils that have slopes of as much as 18 percent.

Runoff is rapid and erosion is a severe hazard if this soil is used for cultivated crops. Slopes, limited depth to bedrock, and slow permeabilty are limitations to some nonfarm uses of this soil. Capability unit IIIe-3; woodland suitability group 2w2.

Rittman-Urban land complex, undulating (RuB).—This mapping unit consists of undulating areas where much of the original Rittman has been destroyed or covered by digging and grading. Most areas are used for urban or industrial development. Borrow or fill areas make up 50 to 75 percent of the mapping unit, but the soils are undisturbed in undeveloped lots, in the back part of developed lots, and in small wooded areas.

Fill areas typically consist of about 1 to 3 feet of material overlying undisturbed Rittman soils or inclusions of wetter, lower lying Wadsworth soils. The fill is moderately fine textured material from the subsoil and calcareous, moderately fine textured material from the substratum. In borrow areas the substratum or subsoil of these soils is exposed.

The surface layer in graded areas commonly has a low organic-matter content and poor tilth. The hazard of erosion is severe, particularly if the soil is bare of vegetation during construction. Gullying and sedimentation commonly occur during construction unless conservation practices are used. Capability unit not assigned; woodland suitability group 2w2.

Rittman-Urban land complex, rolling (RuC).—This mapping unit consists of rolling to hilly areas where much of the original Rittman soils has been destroyed or covered by digging and grading. Most areas are used for urban or industrial development. Borrow or fill areas make up 50 to 75 percent of this mapping unit, but the soils are undisturbed in undeveloped lots, in the back part of developed lots, and in small wooded areas.

Fill areas typically consist of about 1 to 3 feet of fill material overlying undisturbed Rittman soils or inclusions of wetter, lower lying Wadsworth soils. The fill is moderately fine textured material from the subsoil or calcareous material from the substratum of these soils. In borrow areas the substratum or subsoil of these soils is exposed.

The surface layer in graded areas commonly has a low organic-matter content and poor tilth. The hazard of erosion is severe, particularly if the soil is bare of vegetation during construction. Gullying and sedimentation commonly occur during construction unless conservation

practices are used. Slope is a dominant limitation to many nonfarm uses of this soil. Capability unit not assigned; woodland suitability group 2w2.

Rough Broken Land

Rough broken land is made up of Rough broken land, clay and silt, and Rough broken land, silt and sand.

Rough broken land, clay and silt (Rv).—This mapping unit is very steep and is on valley walls along the Cuyahoga River and some of its tributaries in northern Summit County. Local relief ranges from 50 to 150 feet. The dominant slopes range between 35 and 70 percent. The slopes are irregular and are broken in many places by intermittent drainageways. Soil slips are common, and commonly the slopes are a succession of short slips. Soil material is calcareous lacustrine clay or silt. A texture of clay is dominant north of the village of Peninsula, and silt is dominant south of Peninsula. The soil profile is similar to that of Geeburg soils where a clay texture is dominant and to that of Glenford soils where silty material is dominant. In some places there are thin, sandy layers. In most areas, slips have obliterated the natural soil profile.

Rough broken land, clay and silt, is mostly wooded. Surface runoff is very rapid. Slope, erosion, and the hazard of slippage are dominant limitations to the use of this land type. Rough broken land, clay and silt, has a high potential for parkland and open-space recreation areas. Capability unit VIIe-1; woodland suitability group 2r1.

Rough broken land, silt and sand (Rw).—This mapping unit is located mainly in the Cuyahoga River Valley. Slopes are dominantly between 35 to 70 percent, and local relief ranges from 50 to 150 feet. The soil material consists of layers of silt, sand, and gravel. Springs or seeps are common, particularly where the sand and gravel layers are exposed. Erosion is active, and slips are common where silt and interbedded clay layers are present. Frequent slips and erosion have obliterated the profiles of developed soils. In some areas the soils are similar to Conotton soils, and in others they are similar to Glenford soils.

Rough broken land, silt and sand, is largely wooded. Surface runoff is very rapid. Slope, erosion, and the hazard of slippage are limitations to most uses. Rough broken land, silt and sand, has a high potential for parkland and open-space recreation areas. Capability unit VIIe-1; woodland suitability group 2r1.

Sebring Series

The Sebring series consists of nearly level, poorly drained soils on stream terraces throughout the county. These soils formed in sediment high in silt content.

In a representative profile of a Sebring soil that has been cultivated, the plow layer is dark grayish-brown silt loam about 9 inches thick. The upper part of the subsoil, to a depth of 14 inches, is gray silt loam. Below this, to a depth of 42 inches, the subsoil is gray silty clay loam. The lower part of the subsoil, to a depth of 50 inches, is strong-brown and gray silty clay loam. The underlying material, to a depth of 60 inches or more, is yellowish-brown, stratified loam and silt loam.

Sebring soils have moderately slow permeability. Unless they are drained, they have a high water table late in winter, in spring, and early in summer. The rooting zone in these soils is deep in drained areas and when the water table is low in summer. The available moisture capacity is high. Where the soils have not been limed, they are very strongly acid in the upper 24 inches. Sebring soils are soft and compressible when saturated.

About half the acreage of Sebring soils has been cleared, but most cleared areas are not presently farmed. Because of the lack of adequate artificial drainage, few areas are cultivated. Drainage is beneficial to crops.

Representative profile of Sebring silt loam, in a field one-half mile south of Barberton in SE¼SW¼ sec. 6, Franklin Township, 200 feet south of drive-in-theater, and 100 feet west of 83rd Division Memorial Highway:

Ap—0 to 9 inches, dark grayish-brown (2.5Y 4/2) silt loam; moderate, medium, granular structure; friable; many roots; very strongly acid; abrupt, smooth boundary.

B1g—9 to 14 inches, gray (5Y 6/1) silt loam; a few, fine, distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium, subangular blocky structure; friable; common roots; a few fine concretions; very strongly acid; clear, smooth boundary.

B21tg—14 to 26 inches, gray (5Y 5/1) silty clay loam; many, medium, distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium, prismatic structure parting to weak, medium, subangular blocky structure; firm; few roots; gray (5Y 5/1–6/1) ped coatings; medium, patchy, gray (5Y 5/1) clay films on ped faces and in pores in ped interiors; patchy silt coatings; very strongly acid; clear, smooth boundary.

B22tg—26 to 37 inches, gray (5Y 5/1) silty clay loam; many, medium, distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium, prismatic structure parting to weak, medium, subangular blocky; firm; few roots along vertical ped faces; medium, patchy, gray (5Y 5/1) clay films on ped faces and in ped interiors; strongly acid; clear, smooth boundary.

B23tg—37 to 42 inches, gray (5Y 5/1) silty clay loam; many, medium, prominent, strong-brown (7.5YR 5/8) mottles; weak, medium, prismatic structure parting to weak, medium, subangular blocky structure; firm; medium, patchy, gray (5Y 5/1) clay films in ped interiors and on ped faces; strongly acid; clear, smooth boundary.

B3—42 to 50 inches, strong-brown (7.5YR 5/8) and gray (5Y 5/1) silty clay loam; weak, medium, prismatic structure; firm; thin, very patchy, gray (5Y 5/1) clay films on vertical ped faces; medium acid; clear, smooth boundary.

IIC—50 to 60 inches, yellowish-brown (10YR 5/8) stratified loam and silt loam; massive; friable; medium acid.

The solum ranges from 35 to 50 inches in thickness. Uncultivated areas have an A1 horizon that is very dark gray (10YR 3/1) or very dark grayish-brown (10YR 3/2) and is 3 to 4 inches thick, and an A2 horizon that is gray (5Y 5/1 or 6/1) or dark gray (5Y 4/1) and is 3 to 6 inches thick. The B1 horizon is silt loam or silty clay loam. In some places the B1 horizon is absent.

The Btg horizon ranges from 20 to 34 inches in thickness and is at a depth of 8 to 14 inches. The matrix has a hue of 5Y or N, value of 4 or 5, and chroma of 0 and 1. Mottles have hues of 10YR and 7.5YR, value of 4 or 5, and chroma of 4 to 8. This horizon is silt loam to silty clay loam that has an average clay content of less than 35 percent. Content of sand coarser than very fine sand is less than 15 percent, but thin strata of loam or clay loam occur in the Bt horizon in some places. The A horizon and the upper part of the B horizon are very strongly to medium acid, and the lower part of the B horizon is strongly acid to medium acid.

Sebring soils are the poorly drained members of a drainage sequence that includes the moderately well drained Glenford soils, the somewhat poorly drained Fitchville soils, and the very poorly drained Luray soils. They commonly are adjacent

to Fitchville, Canadice, Mahoning, Trumbull, and Wadsworth soils. Sebring soils have a lower clay content in the B horizon than Canadice and Trumbull soils. They have a grayer B horizon than Mahoning and Wadsworth soils.

Sebring silt loam (Sb).—This nearly level soil is on broad, low terraces. Most areas are 5 to 50 acres in size.

Included in mapping, particularly in shallow depressions, are small spots of dark-colored, very poorly drained Luray soils. Also included are small knolls of somewhat poorly drained Fitchville soils and areas of Sebring soils where the subsoil, between depths of 15 and 30 inches, is less gray and more brown than described for the series. In addition, a few areas that have a silty clay loam surface layer that is sticky when wet are included.

Runoff is slow to ponded, and the surface layer is susceptible to crusting. Seasonal wetness and poor natural drainage are a severe limitation if this soil is used for cultivated crops. Moderately slow permeability and seasonal wetness are limitations to many nonfarm uses of this soil. Capability unit IIIw–2; woodland suitability group 2w1.

Shale Rock Land

Shale rock land (Sc) is very steep and consists of shale outcrops along the Cuyahoga River and some of its tributaries. Slopes dominantly range from 35 to 70 percent. Soil has formed in very few areas of this land type. The exposures of gray shale and the interbedded strata of sandstone and siltstone are acid. Shaly slump areas are on the lower slopes.

This land type generally is bare of vegetation, but in some places hemlock grows on the lower slopes. Surface runoff is very rapid. Very steep slopes and bedrock exposures are limitations to nearly all uses of this land type. Capability unit VIIe–1; woodland suitability group 4.

Sloan Series

The Sloan series consists of nearly level, very poorly drained soils. These soils formed in neutral to weakly calcareous alluvium in slack-water areas of flood plains throughout the county.

In a representative profile of a Sloan soil in a pasture, the surface layer is black silt loam 12 inches thick. The subsurface layer is black, friable loam 4 inches thick. The subsoil, which extends to a depth of 30 inches, is gray silt loam. The underlying material, to a depth of 40 inches, is dark greenish-gray silt loam. Below this, to a depth of 60 inches or more, it is dark-gray sandy loam.

Sloan soils are subject to periodic flooding. They have a high water table at or near the surface for much of the year. Internal drainage and permeability are moderately slow. The rooting zone is deep if these soils are drained. The available moisture capacity is high. Sloan soils are medium acid in the upper 30 inches.

Most of the acreage is wooded. Because these soils lack adequate drainage and flood protection, only a few areas are cultivated. A few areas are in pasture. Artificial drainage is beneficial to crops.

Representative profile of Sloan silt loam, in a pasture in Franklin Township, 300 feet east and 800 feet south of Comet Road and 2,100 feet west of South Main Street:

A11—0 to 2 inches, dark-gray (10YR 4/1) silt loam; common, medium, distinct, brown (7.5YR 4/4) silt loam; moderate, medium, granular structure; friable; medium acid; abrupt, smooth boundary.

A12—2 to 12 inches, black (10YR 2/1) silt loam; common, fine, distinct, brown (7.5YR 4/4) mottles; moderate, coarse, granular structure; friable; medium acid; clear, smooth boundary.

A3—12 to 16 inches, black (10YR 2/1) loam; common, fine, distinct, brown (7.5YR 4/4) mottles; weak, medium, subangular blocky structure; friable; medium acid; abrupt, wavy boundary.

B2g—16 to 30 inches, gray (5Y 5/1) silt loam; common, fine, distinct, brown (7.5YR 4/4) mottles; weak, medium and coarse, prismatic structure; friable; medium acid; clear, smooth boundary.

C1g—30 to 40 inches, dark greenish-gray (5GY 4/1) silt loam; common, medium, prominent, dark reddish-brown (5YR 3/4) mottles; massive; friable; slightly acid; clear, smooth boundary.

IIC2g—40 to 60 inches, dark-gray (N 4/0) sandy loam; massive; friable; neutral.

The A horizon ranges from 10 to 18 inches in thickness. The A1 horizon generally is black (10YR 2/1) or very dark gray (10YR 3/1), but there is a very thin, dark-gray (10YR 4/1) A11 horizon in some places. The B horizon has hues of 10YR to 5Y, value of 4 or 5, and chromas of 0 to 2. The B horizon is medium acid or slightly acid. The texture, to a depth of 40 inches, is silt loam, loam, or silty clay loam. Average clay content to a depth of 40 inches is between 18 and 35 percent. Stratification is apparent in the C horizons in most places.

The Sloan soils in this survey area are more acid than Sloan soils in other survey areas. This slight difference does not greatly affect the usefulness or behavior of these soils.

Sloan soils are the very poorly drained members of a drainage sequence that includes the well drained Chagrin soils, the moderately well drained Lobdell soils, the somewhat poorly drained Orrville soils, and the poorly drained Holly soils. They are adjacent to the members of their drainage sequence, but more commonly they are adjacent to the Olmsted, Luray, and Carlisle soils. Sloan soils lack the Bt horizon that is present in Olmsted and Luray soils. They are mineral soils in contrast to Carlisle soils, which are organic.

Sloan silt loam (So).—This nearly level soil is on broad flood plains. The most extensive areas are in the southern part of the county along Nimisila Creek and the Tuscarawas River. Most areas are more than 10 acres in size. Included in mapping are small spots of Carlisle muck, small areas of dark-colored, very poorly drained Luray soils, and a few areas where the dark surface layer is only 6 to 10 inches thick. Also included are areas of soils that are covered by a recent overwash of lighter colored alluvium as much as 8 inches thick.

Runoff is very slow to ponded, and wetness is a severe limitation to cultivated crops. A high water table and the hazard of flooding are limitations for most nonfarm uses. Capability unit IIIw–1; woodland suitability group 2w1.

Tioga Series

The Tioga series consists of nearly level, well-drained soils that formed in recent alluvium. These soils are on flood plains throughout the county.

In a representative profile of a Tioga soil that has been cultivated, the surface layer is very dark grayish-brown loam about 8 inches thick. The subsoil, to a depth of 15 inches, is brown loamy sand. Between depths of 15 and 24 inches, the subsoil is brown silt loam. The underlying material to a depth of 60 inches consists of 18 inches of brown loam, 6 inches of dark-gray loamy sand,

and 12 inches or more of dark-gray very gravelly loamy sand.

Tioga soils are subject to flooding. They have moderate permeability, a deep rooting zone, and medium to low available moisture capacity. The Tioga soils are mostly slightly acid to neutral.

Many areas of Tioga soils have been cleared, but few areas are presently cultivated. Corn, wheat, and grasses and legumes are the principal crops. Some areas are wooded.

Representative profile of Tioga loam, in a field in Peninsula village, T. 4 N., R. 11 W., 1,600 feet north of State Route 303 along Boston Run:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) loam; dark grayish brown (10YR 4/2) crushed; weak, medium, granular structure; friable; about 10 percent pebbles; neutral; clear, smooth boundary.

B1—8 to 15 inches, brown (10YR 4/3) loamy sand; weak, medium, platy structure; friable; neutral; clear, smooth boundary.

B2—15 to 24 inches, brown (10YR 4/3) silt loam; weak, medium, platy structure; friable; about 10 percent pebbles; neutral; clear, smooth boundary.

C1—24 to 42 inches, brown (10YR 4/3) loam; massive to weak, medium, platy structure; friable; neutral; abrupt, smooth boundary.

IIC2—42 to 48 inches, dark-gray (5Y 4/1) loamy sand, common, medium, distinct, yellowish-brown (10YR 5/4) mottles; single grain; loose; neutral; abrupt, wavy boundary.

IIIC3—48 to 60 inches, dark-gray (5Y 4/1) very gravelly loamy sand; single grain; loose, neutral.

The solum ranges from 15 to 30 inches in thickness. The reaction, to a depth of 42 inches, is slightly acid to neutral. The B horizon is loamy sand, fine sandy loam, loam, and silt loam.

The Tioga soils in this survey area are slightly acid to neutral, in contrast to more acid Tioga soils in other survey areas. They also have a more platy structure than Tioga soils elsewhere. These slight differences do not greatly influence the usefulness or behavior of these soils.

Tioga soils commonly occupy positions on flood plains similar to those of the Chagrin and Lobdell soils. They have a higher sand content throughout the profile than the well drained Chagrin soils and the moderately well drained Lobdell soils. They are better drained than the Lobdell soils.

Tioga loam (Tg).—This nearly level soil is mainly on narrow flood plains, but it also is in broader areas on the flood plain of the Cuyahoga River. It generally has good tilth. In some areas, particularly on the narrow flood plains, streams flow over bedrock. In these areas the soils contain a significant amount of stones and channery fragments. The narrow areas of this soil are commonly cut up by meandering channels. This soil commonly occurs in slightly higher positions on the flood plain along the Cuyahoga River than other soils, and it is flooded less frequently than those soils.

Flooding is a moderate hazard to farming. It is a major limitation to nonfarm uses of this soil. Capability unit IIw-5; woodland suitability group 1o1.

Trumbull Series

The Trumbull series consists of nearly level, poorly drained soils that formed in silty clay loam or clay loam glacial till of Wisconsin age. These soils are in the northern part of the county.

In a representative profile of a Trumbull soil that has been cultivated, the plow layer is dark grayish-brown silt loam. Below this, to a depth of 31 inches, is dark-gray silty clay loam. The lower part of the subsoil is dark yellowish-brown silty clay loam to a depth of 37 inches and dark-brown silty clay loam to a depth of 50 inches. Below the subsoil, the underlying material is dark-brown clay loam to a depth of 60 inches or more.

Trumbull soils have very slow permeability in the subsoil and in the underlying glacial till. They are saturated with water for long periods in winter, in spring, and early in summer. Runoff is slow, and ponding commonly occurs after a heavy rain. These soils dry and warm slowly in spring unless they have adequate drainage. The rooting zone is mostly moderately deep and strongly acid or very strongly acid. The available moisture capacity is medium.

Most areas of Trumbull soils are not presently farmed. Some areas are wooded. Most areas need drainage for a good growth of crops.

Representative profile of Trumbull silt loam, in a field 1¼ miles southeast of the village of Hudson in Hudson Township, T. 4 N., R. 10 W., 600 feet north of Barlow Road and 1,400 feet east of State Route 91:

Ap—0 to 7 inches, dark grayish-brown (2.5Y 4/2) silt loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, coarse, granular structure; friable; very strongly acid; abrupt, smooth boundary.

B1g—7 to 15 inches, grayish-brown (2.5Y 5/2) silt loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium, prismatic structure parting to weak, medium, subangular blocky structure; firm; common fine pores; grayish-brown (2.5Y 5/2) ped coatings; 1 percent coarse fragments; very strongly acid; clear, wavy boundary.

B21tg—15 to 31 inches, dark-gray (5Y 4/1) heavy silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; strong, medium, prismatic structure parting to moderate, medium, subangular blocky structure; firm; thin, continuous, gray (5Y 5/1) clay films in ped interiors; 1 to 2 percent coarse fragments; strongly acid; clear, wavy boundary.

B22tg—31 to 37 inches, dark yellowish-brown (10YR 4/4) heavy silty clay loam; many, medium, distinct, gray (5Y 5/1) mottles; weak, coarse, prismatic structure; firm; thin, patchy, gray (5Y 4/1) clay films on vertical ped faces and in ped interiors; about 2 percent coarse fragments; medium acid; clear, smooth boundary.

B23t—37 to 50 inches, dark-brown (10YR 4/3) silty clay loam; common, medium, distinct, gray (5Y 5/1) mottles; massive; firm; thin, patchy, dark-gray (5Y 4/1) clay films in pores; common black (10YR 2/1) oxide stains; 2 percent coarse fragments; slightly acid; clear, wavy boundary.

C—50 to 60 inches, dark-brown (10YR 4/3) clay loam; massive; firm; 2 percent coarse fragments composed mainly of siltstone and shale; mildly alkaline and calcareous.

An A1 horizon, if present, ranges from 1 to 4 inches in thickness and is typically very dark brown (10YR 2/2), very dark grayish-brown (10YR 3/2), or very dark gray (10YR 3/1). An A2 horizon, 3 to 4 inches thick and gray (10YR 5/1) or dark gray (10YR 4/1), underlies the A1 horizon in undisturbed areas.

The B horizon ranges from 24 to 50 inches in thickness. The ped surfaces in the upper 6 to 15 inches of the B horizon have grayish-brown (2.5Y 5/2) to gray (10YR 5/1) silt coatings on most vertical and some horizontal surfaces. The matrix of the B horizon, to a depth of 30 inches or more, has a hue of 5Y, 2.5Y, or N, value of 4 or 5, and chroma of 0 to 2. It has mottles in a hue of 10YR, value of 4 or 5, and chroma of 4 to 8. The Bt horizon is dominantly silty clay loam and has a weighted average content of 35 to 40 percent. The upper part of the B horizon ranges from slightly acid to very strong-

ly acid. Reaction is less acid with increasing depth. The lower part of the B2t horizon is commonly slightly acid to neutral. Depth to calcareous material ranges from 42 to 52 inches.

Trumbull soils are the poorly drained members of a drainage sequence that includes the moderately well drained Ellsworth soils and the somewhat poorly drained Mahoning soils. They commonly occupy positions similar to those of the Canadice and Sebring soils. Trumbull soils have a lower clay content, have a higher sand and coarse fragment content, and lack the stratified C horizon of the Canadice soils. They have a higher clay content and a lower silt content in the B horizon than the Sebring soils.

Trumbull silt loam (Tr).—This nearly level soil is mainly along small drainageways or in small depressions adjacent to areas of the better drained Mahoning soils. Most areas are no more than 10 acres in size.

Included in mapping are small spots of very poorly drained Lorain soils in drainageways and depressions and a few areas that have a silty clay loam surface layer. Also included are areas of Trumbull soils that have a subsoil that is less gray and more yellowish than described for the series.

Seasonal wetness is the major limitation to the use of this soil for cultivated crops. Seasonal wetness and very slow permeability are limitations to many nonfarm uses of this soil. Capability unit IVw–1; woodland suitability group 2w1.

Urban Land

Urban land (Ur) consists of areas 10 acres or more in size that are covered by buildings, pavement, or other manmade surfaces. Among these areas are commercial and industrial areas, large factories, shopping centers, warehouses, and railroad yards. The slope ranges from 0 to 25 percent. Most areas have a very low infiltration rate and very rapid runoff. Large areas of Urban land materially increase the volume of water flowing in nearby streams after a rain. Urban land can be a source of pollution in nearby streams unless there is careful management of these areas. Capability unit not assigned; woodland suitability group 4.

Wadsworth Series

The Wadsworth series consists of nearly level to gently sloping, somewhat poorly drained soils that have a fragipan. These soils formed in silty clay loam and silt loam glacial till of Wisconsin age. They are on uplands in the northern part of the county.

In a representative profile of a Wadsworth soil that has been cultivated, the plow layer is dark grayish-brown silt loam about 8 inches thick. The upper part of the subsoil, to a depth of 14 inches, is yellowish-brown silt loam. Below this, the subsoil is firm, yellowish-brown clay loam to a depth of 23 inches. The lower part of the subsoil, between depths of 23 and 44 inches, is a dense, compact, dark-brown silty clay loam fragipan. Below the fragipan, to a depth of 54 inches, the subsoil is dark-brown silty clay loam. The underlying material is dark-brown silty clay loam glacial till to a depth of 80 inches or more. This till material is compact and calcareous and contains pebbles and fragments of shale and siltstone.

Wadsworth soils have slow permeability in the fragipan and the underlying glacial till. They have a perched water table near the surface late in winter and in spring. When these soils are saturated, water tends to flow laterally above the fragipan. The rooting zone is moderately deep, and available moisture capacity is medium. The soils are very strongly acid above the fragipan.

Few areas of Wadsworth soils are cultivated. Where the soils are cultivated, the main crops are wheat, corn, and grass-legume meadow. These soils are wooded in many areas. Artificial drainage is beneficial to crops.

Representative profile of Wadsworth silt loam, 0 to 2 percent slopes, in a cultivated field in Twinsburg Township, T. 5 N., R. 10 W., 1¼ mile west of State Route 91, 1,200 feet south of Highland Road along railroad spur, and 1⅛ mile east of State Route 631, (sample No. ST–24 in table 10):

Ap—0 to 8 inches, dark grayish-brown (2.5Y 4/2) silt loam; moderate, fine, granular structure; friable; many roots; few coarse fragments; strongly acid; abrupt, smooth boundary.

B&A—8 to 14 inches, yellowish-brown (10YR 5/6) silt loam; common, medium, distinct, gray (5Y 6/1) mottles; moderate, medium, subangular blocky structure; friable; common roots; light brownish-gray (2.5Y 6/2) coating on ped faces; 2 percent coarse fragments; very strongly acid; clear, smooth boundary.

B2tg—14 to 23 inches, yellowish-brown (10YR 5/8) clay loam; many, medium, distinct, dark-gray (5Y 4/1) mottles; moderate, medium, subangular blocky structure; firm, few roots; gray (5Y 6/1) ped coatings; thin, patchy, dark-gray (5Y 4/1) clay films on ped faces; 2 percent coarse fragments; very strongly acid; clear, smooth boundary.

Bx1g—23 to 35 inches, dark-brown (10YR 4/3) silty clay loam; few, fine, distinct, gray (5Y 6/1) mottles; moderate, coarse, prismatic structure; very firm, brittle; few roots in fractures between polygons; medium, continuous, gray (5Y 5/1) clay films on vertical faces; common, medium, black (10YR 2/1) oxide stains in polygon interiors; 2 percent coarse fragments; strongly acid; gradual, wavy boundary.

Bx2g—35 to 44 inches, dark-brown (10YR 4/3) silty clay loam; moderate very coarse prismatic structure; very firm, brittle; medium, continuous, gray (5Y 5/1) clay films on vertical faces; yellowish-brown (10YR 5/8) band adjacent to clay films; 2 percent coarse fragments; slightly acid; gradual, wavy boundary.

B3g—44 to 54 inches, dark brown (10YR 4/3) silty clay loam; moderate, very coarse, prismatic structure; firm; thin gray (5Y 5/1 to 6/1) coatings on vertical faces; 2 percent coarse fragments; mildly alkaline; gradual, wavy boundary.

C1—54 to 70 inches, dark-brown (10YR 4/3) silty clay loam; common, medium, distinct, gray (5Y 6/1) and yellowish-brown (10YR 5/8) mottles; massive; firm; 2 percent coarse fragments; mildly alkaline and calcareous; gradual, smooth boundary.

C2—70 to 80 inches, dark-brown (10YR 4/3) silty clay loam; massive; firm; mildly alkaline; calcareous.

In wooded areas the A1 horizon is very dark grayish brown (10YR 3/2) to a depth of 1 to 4 inches. The A2 horizon is mottled with variations of grayish brown (10YR 5/2 to 2.5Y 5/2) and light brownish gray (10YR 6/2 to 2.5Y 6/2). The B&A horizon generally has yellowish brown (10YR 5/4 or 5/6) and brown (10YR 5/3) ped interiors that have light brownish-gray (10YR, 2.5Y 6/2), grayish-brown (10YR 5/2), and gray (5Y 6/1) mottles and coatings.

The Bt horizon above the fragipan (Bx horizon) is yellowish brown (10YR 5/4 to 5/8), dark yellowish brown (10YR 4/4), or brown (10YR 4/3). Mottles are light brownish gray (10YR 6/2) to grayish brown (2.5Y 5/2), and gray (N 5/0 or N 6/0 to 10YR 5/1) to dark gray (5Y 4/1) in varying proportions. Ped surfaces vary from gray (5Y 6/1) to grayish brown (10YR 5/2 to 2.5Y 5/2) and dark grayish brown (10YR 4/2 to 2.5Y 4/2). The Bt horizon commonly has moderate, subangular blocky structure, but in some places the structure is moderate, medium, prismatic. The Bt horizon is clay loam

or silty clay loam. The average clay content is 27 to 35 percent. Depth to the fragipan ranges from 20 to 26 inches. The fragipan ranges from 18 to 32 inches in thickness and is light clay loam, silty clay loam, heavy loam, or silt loam. Prism interiors are light olive brown (2.5Y 5/4), olive brown (2.5Y 4/4), dark brown (10YR 4/3), or yellowish brown (10YR 5/4 to 5/6). Mottles of gray (5Y 5/1 to 6/1) or grayish brown (2.5Y 5/2) are commonly present. The prominent clay films on the vertical ped faces vary from dark gray (5Y 4/1) or gray (5Y 5/1) to grayish brown (2.5Y 5/2). The depth to calcareous material ranges from 40 to 60 inches. The solum is typically very strongly acid to strongly acid well into the fragipan; the lower part of the Bx horizon is slightly acid to neutral.

Wadsworth soils are the somewhat poorly drained members of a drainage sequence that includes the moderately well drained Rittman soils. They are commonly adjacent to Rittman, Mahoning, Fitchville, and Sebring soils. The Wadsworth soils have a fragipan that is lacking in the Mahoning, Fitchville, and Sebring soils. They have a higher sand content and contain less silt in the B and C horizons than Fitchville and Sebring soils.

Wadsworth silt loam, 0 to 2 percent slopes (WaA).—A profile of this soil is described as representative for the series. The soil is in areas 3 to 10 acres in size. Runoff is slow, and the surface layer is highly susceptible to surface crusting. Included in mapping are small spots of wetter Trumbull and Sebring soils.

Soil wetness is a moderate limitation if this Wadsworth soil is used for cultivated crops. Seasonal wetness and slow permeabiilty are limitations to many nonfarm uses of this soil. Capability unit IIIw-4; woodland suitability group 2w2.

Wadsworth silt loam, 2 to 6 percent slopes (WaB).—This soil is in areas near the heads of drainageways and in upland areas. Slopes are long in upland areas. Areas range from 10 to 100 acres in size. Included in mapping are small knolls of better drained Rittman soils. Also included, particularly in drainageways, are a few spots of poorly drained Trumbull soils.

Where slopes are long, water moves laterally downslope along the upper surface of the fragipan. Seasonal wetness is the principal limitation to the use of this soil for crops. Erosion is a hazard, particularly on long slopes. Seasonal wetness, slope, and slow permeability are limitations to many nonfarm uses of this soil. Capability unit IIIw-4; woodland suitability group 2w2.

Wadsworth-Urban land complex (Wb).—This mapping unit consists of areas where the original Wadsworth soils have been largely destroyed or covered by grading and digging. Most areas are used for urban or industrial development. Slopes range from 0 to 6 percent. Borrow or fill areas make up 50 to 75 percent of the mapping unit, but the soils are undisturbed in undeveloped lots and in small wooded areas.

Fill areas consists of about 1 to 3 feet of fill material overlying undisturbed Wadsworth soils or inclusions of wetter, lower lying Sebring soils. The fill is loamy material from the subsoil and underlying material of the Wadsworth soils. In borrow areas the substratum or subsoil of these soils is exposed.

The surface layer in graded areas commonly has a low organic-matter content and fertility. The surface layer tends to become hard as it dries. Seasonal wetness is a limitation, particularly where grading has made depressional or bowl-shaped areas. Erosion is a hazard if the surface is bare during construction. Capability unit not assigned; woodland suitability group 2w2.

Wallkill Series

The Wallkill series consists of very poorly drained soils that formed in mineral material overlying muck. These soils are in basinlike areas on uplands and along streams.

In a representative profile of a Wallkill soil that has not been cultivated, the surface layer is dark grayish-brown silt loam about 4 inches thick. The next layer is mottled, dark grayish-brown silt loam 11 inches thick. Between depths of 15 and 25 inches is a layer of black, friable silty clay loam. Below a depth of 25 inches is very dark brown muck.

Wallkill soils have a water table at or near the surface from late in winter through early in summer. Internal drainage is slow, and permeability is moderate to moderately slow. The rooting zone in these soils is deep in summer and in drained areas, and available moisture capacity is high. The profile is medium acid above the muck and is very strongly acid in the muck.

Most areas of Wallkill soils are cultivated, but some are wooded. Only a few areas are not cultivated, because they lack adequate drainage and flood protection. Drainage is beneficial to crops in most places.

Representative profile of Wallkill silt loam, in an uncultivated area in Bath Township, T. 3 N., R. 12 W., 1 mile west of Bath, 600 feet north of Ira Road, and 900 feet west of North Fork of Yellow Creek:

A1—0 to 4 inches, dark-grayish brown (2.5Y 4/2) silt loam; moderate, medium, granular structure; friable; medium acid; abrupt, smooth boundary.

B—4 to 15 inches, dark grayish-brown (2.5Y 4/2) silt loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; friable; medium acid; clear, smooth boundary.

IIAb—15 to 25 inches, black (10YR 2/1) light silty clay loam; common, fine, distinct, brown (7.5YR 4/4) mottles; massive, friable; dark grayish-brown (2.5Y 4/2) silt loam material in cracks; medium acid; abrupt, smooth boundary.

IIIOab—25 to 60 inches, very dark brown (10YR 2/2) muck (sapric material); nonfibrous; very strongly acid.

The B horizon ranges from 6 to 15 inches in thickness. The IIAb horizon is as much as 10 inches thick, but it is absent in some profiles. Depth to the muck layer ranges from 20 to 30 inches. The mineral part of the solum ranges from medium acid to neutral and is silt loam or silty clay loam.

Wallkill soils differ from other very poorly drained mineral soils in the county by having buried muck within a depth of 40 inches. They differ from the very poorly drained organic soils by having an overwash of mineral soil 20 to 30 inches thick.

Wallkill silt loam (Wc).—This nearly level soil is in closed depressions in which surface water is impounded. Areas are roughly circular and are less than 10 acres in size. The mineral layer is sticky silty clay in an area of this soil near Brandywine Creek in the northern part of the county. Included in mapping are a few areas of soils that are underlain by a dark-colored mineral layer rather than by a mucky layer. These included areas are mainly in Green Township.

Wetness is a severe limitation to farming. A high water table and instability of the soil if used for structures are major limitations to many nonfarm uses of this soil. Capability unit IIIw-1; woodland suitability group 2w1.

Wheeling Series

The Wheeling series consists of nearly level to gently sloping, well-drained soils that formed in loamy material over outwash gravel and sand. These soils are on outwash terraces, mainly in the southern part of the county. The upper 30 to 48 inches of these soils generally is silt loam.

In a representative profile of a Wheeling soil in a wooded area, the surface layer is very dark brown silt loam about 3 inches thick. The subsurface layer, to a depth of 10 inches, is yellowish-brown silt loam. The subsoil, to a depth of 35 inches, is friable, dark yellowish-brown, brown, and strong-brown silt loam. Beneath this the texture is coarser with increasing depth. The lower part of the subsoil, to a depth of 39 inches, is strong-brown sandy loam. The underlying material, to a depth of 49 inches, is dark-brown sandy loam. Below this, to a depth of 60 inches or more, it is stratified, dark-brown and dark yellowish-brown medium and coarse sand.

Wheeling soils have moderate permeability in the subsoil and rapid permeability in the underlying gravel and sand. They warm up and dry out early in spring. The rooting zone in these soils is deep and strongly acid or very strongly acid. The available moisture capacity is mostly medium to high. Wheeling soils are a potential source of sand and gravel for construction.

Most areas of Wheeling soils are used for crops. The main crops grown are corn, wheat, and grass-legume meadow.

Representative profile of Wheeling silt loam, 2 to 6 percent slopes, in a wooded area in sec. 20, Franklin Township, 1,800 feet west of 83rd Division Memorial Highway and 1,400 feet north of Center Road (sample No. ST-26 in table 10):

O1—1 inch to 0, partially decomposed layer of leaves and twigs.

A1—0 to 3 inches, very dark-brown (10YR 2/2) silt loam; moderate, fine, granular structure; friable; many roots; 2 percent pebbles; medium acid; abrupt, smooth boundary.

A2—3 to 10 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, subangular blocky structure; friable; many roots; many voids filled with A1 horizon material; 2 percent pebbles; strongly acid; clear, smooth boundary.

B1—10 to 14 inches, dark yellowish-brown (10YR 4/4) silt loam; weak to moderate, medium, subangular blocky structure; friable; common roots; 2 percent pebbles; strongly acid; clear, smooth boundary.

B21t—14 to 22 inches, brown (7.5YR 5/4) to strong-brown (7.5YR 5/6) silt loam; moderate, fine and medium, subangular blocky structure; friable, few roots; thin, patchy, brown (7.5YR 5/4) clay films on ped faces; 2 percent pebbles; very strongly acid; clear, smooth boundary.

B22t—22 to 31 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, medium, subangular blocky structure; friable; few roots; thin, continuous, dark-brown (7.5YR 4/4) clay films on ped faces; few black (10YR 2/1) oxide stains; 2 to 5 percent pebbles; very strongly acid; abrupt, smooth boundary.

B23t—31 to 35 inches, strong-brown (7.5YR 5/6) light silt loam; weak, medium, subangular blocky structure; friable; few roots; 5 percent pebbles; very strongly acid; abrupt, smooth boundary.

IIB3—35 to 39 inches, strong-brown (7.5YR 5/6) sandy loam; weak, coarse, subangular blocky structure; firm; 10 percent pebbles; very strongly acid; clear, smooth boundary.

IIC1—39 to 49 inches, dark yellowish-brown (10YR 4/4) sandy loam; massive; friable; 10 percent pebbles; very strongly acid; gradual, smooth boundary.

IIC2—49 to 60 inches, stratified, dark-brown (7.5YR 4/4) and dark yellowish-brown (10YR 4/4) medium and coarse sand in strata ¼ to ½ inch thick; single grain; very friable; 15 percent pebbles; medium acid.

The solum ranges from 38 to 60 inches in thickness and includes a Bt horizon that generally terminates at a depth of less than 35 inches. The silt mantle ranges from 30 to 48 inches in thickness but generally is about 30 inches thick. In cultivated areas the Ap horizon has a hue of 10YR, value of 4 or 5, and chroma of 2. The matrix of the Bt horizon is brown (7.5YR 4/4, 5/4), dark yellowish brown (10YR 4/4), and strong brown (7.5YR 5/6). The B2t horizon is dominantly silt loam. Average clay content in the upper 20 inches of the Bt horizon ranges from 18 to 24 percent. The Bt horizon is very strongly acid or strongly acid. The IIB3 horizon is sandy loam, loam, gravelly sandy loam, and gravelly loam. The IIC horizon ranges from very strongly acid to medium acid. It consists of stratified sand and gravel.

The Wheeling soils in this survey have a lower sand content in the B horizon and are slightly more acid than the defined range for the Wheeling series. These slight differences do not greatly affect their usefulness or behavior.

Wheeling soils commonly occur next to Chili, Oshtemo, and Wooster soils. They are more silty and less gravelly in the B horizon than the Chili and Oshtemo soils. Wheeling soils lack the fragipan and the underlying glacial till of the Wooster soils.

Wheeling silt loam, 0 to 2 percent slopes (WrA).—Areas of this soil are mostly 20 to 60 acres in size. Included in mapping, particularly in low places, are spots of less well drained Glenford soils.

Runoff is slow, and no major hazards limit the use of this soil for cultivated crops. This soil has few limitations to most nonfarm uses. Capability unit I–1; woodland suitability group 1o1.

Wheeling silt loam, 2 to 6 percent slopes (WrB).—A profile of this soil is described as representative for the series. Most areas are 10 to 70 acres in size. Included in mapping are spots of Chili soils on the steeper knolls.

Runoff is slow to medium, and erosion is a moderate hazard if the soil is used for cultivated crops. Slope is a limitation to some nonfarm uses of this soil. Capability unit IIe–2; woodland suitability group 1o1.

Willette Series

The Willette series consists of very poorly drained organic soils that formed in muck deposits 16 to 42 inches thick. These soils are in swampy depressions on terraces and on hummocky uplands. The vegetation is reeds, sedges, and wetland shrubs.

In a representative profile of a Willette soil, black muck extends to a depth of 24 inches. Beneath the muck is gray, firm silty clay that extends to a depth of 60 inches or more.

Willette soils have a high water table for long periods unless they are drained. They have slow permeability in the underlying mineral material. If these soils are artificially drained, their rooting zone is moderately deep. The available moisture capacity is high, and the muck part of these soils is medium acid.

Most areas of Willette soils have been cleared, but few areas are cultivated. These soils are well suited to cultivated crops if they are drained and intensively managed.

Representative profile of Willette muck, in a cultivated field 1¾ miles southwest of Hudson in Hudson Town-

ship, T. 4 N., R. 10 W., 1,100 feet southeast of Mud Lake and 2,200 feet north of Barlow Road:

Oa1—0 to 9 inches, black (10YR 2/1) muck (sapric material); nonfibrous; strong; medium and coarse, granular structure; loose; strongly acid; clear, smooth boundary.

Oa2—9 to 12 inches, black (10YR 2/1) muck (sapric material); few fibers; strong, fine, subangular blocky structure; very friable; some partly decomposed plant remains; medium acid; clear, smooth boundary.

Oa3—12 to 24 inches, black (10YR 2/1) muck (sapric material); few fibers; weak, fine, subangular blocky structure; very friable; some partly decomposed plant remains; medium acid; abrupt, smooth boundary.

IICg—24 to 60 inches, gray (5Y 5/1) silty clay; massive; firm; slightly acid.

The organic material ranges from 16 to 42 inches in thickness. The Oa horizon ranges from very strongly acid to medium acid. The IIC horizon is silty clay loam, silty clay, or clay, but it dominantly is silty clay. The horizon is slightly acid to mildly alkaline.

Willette soils are on landscapes that are similar to those of Carlisle, Linwood, Lorain, Luray, and Olmsted soils. They formed in thinner organic deposits than Carlisle soils. Willette soils have a IIC horizon that has a higher clay content than that of the Linwood soils. They differ from Lorain, Luray, and Olmstead soils by having formed in organic material rather than mineral material.

Willette muck (Wt).—Most areas of this nearly level soil are in Twinsburg and Hudson Townships and generally are less than 5 acres in size. Included in mapping are spots of soils where the muck is less than 16 inches thick.

This mucky soil is swampy in undrained areas. It is soft, compressible, and unstable. It is subject to subsidence, particularly in drained areas. Drainage outlets are difficult to establish in some areas. A high water table is the dominant limitation to most nonfarm uses of this soil. Capability unit IIIw-5; woodland suitability group 4.

Wooster Series

The Wooster series consists of deep, well-drained, gently sloping to steep soils that have a fragipan. These soils formed in loam glacial till of Wisconsin age. They are on uplands, mainly in the southern half of the county.

In a representative profile of a Wooster soil that has been cultivated, the plow layer is dark grayish-brown silt loam about 9 inches thick. The upper part of the subsoil, to a depth of 15 inches, is firm, yellowish-brown silt loam. Below this, to a depth of 30 inches, the subsoil is firm, dark yellowish-brown loam. The lower part of the subsoil, between depths of 30 and 54 inches, is a compact, dark-brown loam fragipan. Below the fragipan, to a depth of 70 inches or more, the underlying material is firm, dark-brown loam glacial till.

Wooster soils have moderate permeability. The fragipan is not so restrictive to water movement as the one in Canfield and Rittman soils. A temporary perched water table of short duration can occur above the fragipan in these soils during wet periods, but drainage is not needed. These soils warm up and dry out early in spring, and they are susceptible to surface crusting. The rooting zone is moderately deep to deep, and available moisture capacity is medium. The upper 30 inches of the profile is medium acid to very strongly acid.

Much of the acreage of the gently sloping Wooster soils is cultivated. The more sloping areas are wooded or are used for pasture. The main crops are corn, wheat, and grass-legume meadow.

Representative profile of Wooster silt loam, 2 to 6 percent slopes, in a cultivated field in Springfield Township, T. 1 N., R. 10 W., 600 feet south of Krumroy Road and 1,400 feet east of Massillon Road:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable; 2 percent coarse fragments; medium acid; abrupt, smooth boundary.

B1t—9 to 15 inches, yellowish-brown (10YR 5/6) silt loam; moderate, medium, subangular blocky structure; firm; 2 percent pebbles; thin, very patchy, brown (7.5YR 4/4) clay films; strongly acid; clear, smooth boundary.

B21t—15 to 23 inches, dark yellowish-brown (10YR 4/4) loam; moderate, medium, subangular blocky structure; firm; 3 percent coarse fragments; common, very dark grayish-brown (10YR 3/2) oxide stains in ped interiors; thin, patchy, brown (7.5YR 4/4) clay films on ped surfaces; thin, patchy, pale-brown (10YR 6/3) coatings; strongly acid; clear, wavy boundary.

B22t—23 to 30 inches, dark yellowish-brown (10YR 4/4) loam; weak, coarse, subangular blocky structure; firm; 10 percent coarse fragments and fine pebbles; thin, patchy, brown (7.5YR 4/4) clay films on ped faces and in pores; many brown (10YR 5/3) degradation surfaces; very strongly acid; clear, irregular boundary.

Bx1—30 to 40 inches, dark-brown (10YR 4/3) loam; weak, coarse, prismatic structure parting to weak, thick, platy structure; very firm and brittle; polygon faces, from the matrix outward, have a yellowish-brown (10YR 5/8) rind and an outer layer of light brownish gray (2.5Y 6/2); common, medium, pale-brown (10YR 6/3) and brown (10YR 5/3) mottles; thin, very patchy clay films; common black (10YR 2/1) oxide stains; strongly acid; gradual, smooth boundary.

Bx2—40 to 54 inches, dark-brown (10YR 4/3) loam; weak, coarse, prismatic structure; very firm and brittle; 5 percent coarse fragments; polygon faces are 1 to 2 millimeters apart and are filled with grayish-brown (2.5Y 5/2) silty clay loam to silty clay; common, medium, yellowish-brown (10YR 5/4) mottles underlain with yellowish brown (10YR 5/8); medium acid; gradual, wavy boundary.

C1—54 to 70 inches, dark-brown (10YR 4/3) loam; massive; firm; 5 percent coarse fragments; medium acid.

The Ap horizon is dark grayish brown (10YR 4/2) or brown (10YR 4/3). In uncultivated areas the A1 horizon is 1 to 5 inches thick and has a value of 3 or 2 and chroma of 1 or 2. The A2 horizon is 2 to 8 inches thick. It is absent in some places where the profile has an Ap horizon. A silt mantle as much as 20 inches thick occurs in some areas of Wooster soils.

A B1 horizon occurs between the A2 and Bt horizons in some places. It is 2 to 8 inches thick and yellowish brown (10YR 5/4 or 5/6). The Bt horizon above the fragipan ranges from 8 to 21 inches in thickness. It generally has moderate, subangular blocky structure, but in some places its structure is weak, medium, prismatic, particularly in the B2t horizon above the Bx horizon. It has a hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4. The Bt horizon is loam or silt loam, and the clay content ranges from 17 to 25 percent. The Bx horizon occurs at a depth ranging from 24 to 30 inches and is 15 to 30 inches thick. This horizon is typically loam, but in some places it is silt loam. The top of the fragipan is commonly irregular, and in some places the fragipan has a very coarse prismatic or polygonal structure. The polygons range from 4 to 10 inches across. The consistence of the Bx horizon is firm or very firm. Brittleness is common in this horizon, but in some profiles it is less evident. In some places the Bx horizon is intermittent or absent.

Polygon coatings are typically clayey and have a chroma of more than 2 in the upper part of the fragipan. Prism in-

teriors have splotches of black concretionary material on broken faces. The solum is typically strongly acid or very strongly acid, but in places it is medium acid in the Bx2 horizon.

Wooster soils are the well drained members of a drainage sequence that includes the moderately well drained Canfield soils, the somewhat poorly drained Ravenna soils, and the poorly drained Frenchtown soils. They are commonly adjacent to Canfield, Chili, Conotton, Loudonville, and Oshtemo soils. Wooster soils have a Bx horizon and formed in glacial till, in contrast to Chili, Conotton, and Oshtemo soils, all of which lack a Bx horizon and formed in loamy outwash. They differ from Loudonville soils in having a Bx horizon and in being deeper to bedrock.

Wooster silt loam, 2 to 6 percent slopes (WuB).—A profile of this soil is described as representative for the series. This soil is on undulating uplands and on side slopes adjacent to drainageways. Areas are more than 10 acres in size.

Included in mapping are areas of soils that are moderately eroded. These soils have a lighter colored and more yellowish-brown surface layer and generally are in poorer tilth than the uneroded soils. Also included are a few areas of soils that have a silt mantle as much as 36 inches thick. These soils are in Franklin Township west of Pancake Creek. Other inclusions are areas of soils where sandstone bedrock is within a depth of 4 to 6 feet and areas of the wetter Canfield soils on low slopes or in seepy areas.

Runoff is slow to medium, and erosion is a moderate hazard if the soil is used for cultivated crops. Moderate permeability and slope are limitations to some nonfarm uses of this soil. Capability unit IIe–2; woodland suitability group 1o1.

Wooster silt loam, 6 to 12 percent slopes (WuC).—Areas of this soil are mostly wooded and vary widely in size and shape. Included in mapping are spots of the wetter Canfield soils on low slopes and at the base of knolls.

Runoff is medium, and the hazard of erosion is severe if this soil is cultivated. Slope and moderate permeability are limitations to some nonfarm uses of this soil. Capability unit IIIe–2; woodland suitability group 1o1.

Wooster silt loam, 6 to 12 percent slopes, moderately eroded (WuC2).—This soil has a profile similar to the one described as representative for the series, except that it is moderately eroded. Erosion has removed 25 to 75 percent of the original surface layer. Depth to the fragipan is less and the organic-matter content and fertility are lower than typical. Water infiltration into the surface layer is slower on this soil than on uneroded Wooster soils. Included in mapping are areas of soils that have layers of sandy and gravelly material. Also included are shallow, wet-weather drainageways.

Runoff is medium to rapid, and erosion is a severe hazard in cultivated areas. Slope and moderate permeability are limitations to many nonfarm uses of this soil. Capability unit IIIe–2; woodland suitability group 1o1.

Wooster silt loam, 12 to 18 percent slopes (WuD).—This soil is mostly on wooded hillsides adjacent to drainageways. Shallow drainageways cross areas of this soil.

Runoff is rapid if this soil is cleared. Erosion is a very severe hazard in cleared and cultivated areas. Slope is the dominant limitation of this soil to many nonfarm uses. Capability unit IVe–1; woodland suitability group 1r1.

Wooster silt loam, 12 to 18 percent slopes, moderately eroded (WuD2).—Rapid runoff has eroded this soil, and the available moisture capacity, organic-matter content, and fertility are lower than those of uneroded Wooster soils. This soil has a lighter colored surface layer and more coarse fragments on the surface than uneroded Wooster soils.

Erosion is a very severe hazard in cultivated areas. This soil is not well suited to row crops, but it is well suited to pasture. Slope and moderate permeability are limitations to many nonfarm land uses of this soil. Capability unit IVe–1; woodland suitability group 1r1.

Wooster silt loam, 18 to 25 percent slopes, moderately eroded (WuE2).—This soil is on hillsides on uplands. Slopes in some areas are very irregularly shaped. Erosion has removed 4 to 6 inches of soil material on about 50 percent of each area, but on most of the remaining acreage, soil losses have been negligible. Shallow drainageways are common. Included in mapping are spots of severely eroded soils and small spots of Chili soils. The Chili soils are in irregularly shaped, hilly areas where strata of gravel occur erratically in the substratum.

Runoff is very rapid. This soil is more droughty than uneroded, less sloping Wooster soils because it is not so deep over the fragipan. It is too steep and too eroded for cultivated crops, but it is suited to pasture if a thick plant cover is maintained to control erosion. Slope and moderate permeability are limitations to most nonfarm uses of this soil. Capability unit VIe–1; woodland suitability group 1r1.

Wooster silt loam, 25 to 50 percent slopes, moderately eroded (WuF2).—This soil is along drainageways. Erosion has removed as much as 50 percent of the original surface layer. The silt mantle is commonly less than 6 inches thick, and in some areas the surface layer is loam. The fragipan is nearer the surface and is thinner than in uneroded, less sloping Wooster soils. Included in mapping are small spots of Oshtemo soils that are more droughty than the Wooster soils.

Runoff is very rapid, and erosion is a severe hazard unless a thick plant cover is maintained. This soil is suited to pasture on all but the steepest slopes. Slope is the dominant limitation to nonfarm uses of this soil. Capability unit VIe–1; woodland suitability group 1r1.

Wooster silt loam, sandstone substratum, 6 to 12 percent slopes, moderately eroded (WvC2).—This soil is on hillsides on uplands and typically is adjacent to areas of Loudonville soils. It has a profile similar to the one described as representative for the series, except that it is underlain by sandstone bedrock at a depth of 40 to 60 inches and is eroded to such an extent that material from the upper part of the subsoil has been worked into the surface layer by plowing. Where the soil is most shallow over bedrock, fragments of sandstone are present throughout and on the surface.

The surface of this soil tends to crust, and seedling survival is commonly low. Runoff is medium, and erosion is a severe hazard in cultivated areas. Slope and depth to bedrock are limitations to many nonfarm uses of this soil. Capability unit IIIe–2; woodland suitability group 1o1.

Wooster silt loam, sandstone substratum, 12 to 18 percent slopes, moderately eroded (WvD2).—This soil is on upland hillsides. Most areas occur as narrow bands

on the hillsides. This soil has a profile similar to the one described as representative for the series, except that it is underlain by sandstone bedrock at a depth of 40 to 60 inches and as much as 50 percent of the original surface layer has been removed through erosion.

Pastures and meadows generally are thin. Runoff is rapid, and erosion is a very severe hazard in cultivated areas. Slope and limited depth to bedrock are limitations to many nonfarm uses of this soil. Capability unit IVe-1; woodland suitability group 1r1.

Wooster-Urban land complex, hilly (WwD).—This mapping unit consists of areas where the original Wooster soils have been destroyed or covered by grading and digging. Most areas are used for urban or industrial development. Borrow or fill areas make up 50 to 75 percent of the mapping unit, but the soils are undisturbed in undeveloped lots, in the back part of developed lots, and in small wooded areas.

Fill areas consist of about 1 to 3 feet of fill material overlying undisturbed Wooster soils or inclusions of Canfield soils. The fill is loamy material from the subsoil and substratum of these soils. In the borrow areas the subsoil and substratum of the Wooster and Canfield soils are exposed.

The surface layer of the disturbed soils commonly has a low organic-matter content and poor tilth. It tends to become hard as it dries. When the subsoil is dry, the fragipan is difficult to excavate. The hazard of erosion is severe, particularly if the soil is bare of vegetation during construction. Seepage downslope is common in wet periods. Steep slopes have not been cleared for farming, and trees generally are common. Sandstone bedrock is within a depth of 10 feet in most places. Slope is a limitation to most nonfarm uses of this soil. Capability unit not assigned; woodland suitability group 1r1.

Formation and Classification of the Soils

This section consists of three main parts. The first part explains the factors of soil formation as they relate to the formation of soils in Summit County, the second part describes the processes of soil formation, and the third part deals with the classification of the soils.

Factors of Soil Formation

Soils are natural bodies that are the products of the five major factors of soil formation. These are parent material, topography or relief, climate, time, and plant and animal life. These factors, individually, do not govern the characteristics of each or every soil to the same degree. In some soils the influence of one factor overshadows the others. The soil-forming factors control the rate and effects of the physical and chemical processes that function within a soil to produce horizon differentiation and a recognizable soil profile.

Climate and plant and animal life are the active soil-forming factors. They act upon different parent materials, and their effects are modified by time and topography. The major difference in the soils of the county are largely the result of differences in the parent material, differences caused by variations in topography, and differences in the length of time during which the soil-forming factors have been active.

Parent material

Unconsolidated glacial deposits of Wisconsin age form the major parent material in Summit County. Only a small acreage in the county is occupied by soils that formed in recent deposits of alluvium and organic materials or in residuum from bedrock.

Several periods of glaciation have passed over the area that is now Summit County. The deposits of the Wisconsin age of the Pleistocene epoch are the only ones present at the surface. These deposits consist of moraines, till plains, outwash, and lacustrine material.

Three surface till deposits have been recognized in Summit County (*15*). These are the loamy Mogadore till, the silt loam Kent till, and the silty clay loam Hiram till.

The Mogadore and Kent tills are in the southern half of the county. They are loam or silt loam in texture and have been leached of carbonates to a depth of 6 to 10 feet. They contain a high proportion of sandstone and fragments of siltstone derived mainly from local bedrock. Wooster, Canfield, Ravenna, and Frenchtown soils formed in areas of these tills.

The northern part of the county is covered mainly by the silty clay loam Hiram till that contains some sandstone and siltstone fragments of local origin. This till is leached of carbonates to a depth ranging from 2½ to 4 feet. Ellsworth, Mahoning, Rittman, Wadsworth, and Trumbull soils formed in the Hiram till. All of these have a higher clay content in the subsoil and substratum than the soils formed in the Mogadore and Kent tills.

Outwash gravel and sand deposits are most extensive in the southern half of the county, but they commonly occur along the major streams and in glacial drainageways throughout the county. The gravel and sand were derived from sandstone, shale, and crystalline rocks. The material in the valley trains is better sorted and not so coarse as it is in the kames. The gravel deposits are commonly low in carbonates. The Conotton, Chili, Bogart, Oshtemo, Jimtown, Damascus, and Olmsted soils formed in outwash materials. They have a higher percentage of coarse fragments and are generally coarser in texture than other soils in the county.

Slack water deposits of silt and clay, or lacustrine material, occurs in the lowlands in Northfield, Copley, Hudson, and Twinsburg Townships and in the Cuyahoga and Little Cuyahoga Valleys. This material ranges from silt loam to clay and is neutral to calcareous. The Caneadea, Geeburg, Canadice, and Lorain soils formed in the finer textured material; and the Glenford, Fitchville, Sebring, and Luray soils formed in the medium-textured material.

Recent alluvium, consisting of silt loam and loam material, occurs along most of the streams in the county. This material commonly is slightly acid to neutral. The Chagrin, Lobdell, Orrville, Holly, and Sloan soils formed in this material.

Kettle holes and abandoned glacial drainageways containing organic deposits are common features in Summit County. The deposits in these areas range from a few feet to as much as 100 feet in thickness. They are made

up of mixed organic material derived from wood and grasses or sedges. The Carlisle, Linwood, and Willette soils formed in this material.

The consolidated rocks that underlie the glacial deposits are conglomerates, sandstone, and shale of Pennsylvanian and Mississippian ages (*19*). Generally, these rocks are so covered with glacial deposits that they have little direct influence as soil parent material.

Many of the hills in the county are capped by resistant conglomerate and sandstone of the Pottsville Formation. Where this rock is close to the surface or is exposed, it has an influence as parent material for Loudonville and Dekalb soils. The Loudonville soils formed partly in thin glacial till and partly in material weathered from rock. The Dekalb soils show little or no influence of glacial till.

In a few areas in the northern part of the county, thin-bedded, fine-grained siltstone and sandstone of the Cuyahoga Group is near the surface. This rock forms the parent material of the Berks soils.

Relief

Relief has affected the formation of the soils in this county, chiefly through its effect on the action of water on or in the soil. The degree of profile development in a soil, within a given time, on a given parent material, and under a given type of vegetation, depends largely on the amount of water that passes through the soil material. This can be illustrated by comparing the Wooster, Canfield, Ravenna, and Frenchtown soils, all of which formed in loam till. The Wooster soils are well drained and have a weak fragipan and a zone of clay accumulation above the fragipan. They have slopes that help speed surface runoff. The Canfield soils are moderately well drained and have a strong fragipan and a zone of clay accumulation above the fragipan. They have slopes that allow some surface runoff but generally less than the Wooster soils. The Ravenna soils are somewhat poorly drained and have a strong fragipan and a zone of clay accumulation above the fragipan. They are nearly level, runoff is slow, and much of the rainfall percolates downward through the soil above the fragipan. The Frenchtown soils are poorly drained and have a fragipan and a zone of clay accumulation above the fragipan. They formed in depressions where water tends to pond.

The relief in most of the county is undulating to rolling, but some steeply sloping areas are on moraines and in the valleys. Level areas occur in some of the major glacial drainageways and on the flood plains.

Slippage and accelerated geological erosion are evident on the very steep soils and on Rough broken land. These effects of slope have contributed to the moderate depth of the very steep Berks soils and the steep Dekalb soils.

Climate

Climate is an active factor in soil formation. Summit County has a humid climate. The rainfall is about 35 inches annually and is fairly evenly distributed. Other climatic data for the county are given in the section "Additional Facts About the County."

Climatic factors that are important in soil formation are precipitation, temperature, and the evapotranspiration ratio. These factors are interrelated with types of vegetation and, on a regional basis, determine the kinds of soil that have developed.

The climate following the retreat of the glaciers was considerable damper and cooler than at present. Following a long period of climatic adjustment, stabilization to the present climate occured. The present climate is such that it has supported a vegetation of hardwood forest for a long time. Precipitation has been sufficient to cause solution and movement of carbonates downward in practically all of the soils; therefore, the uppermost 2 to 3 feet of most soils is acid. A wet microclimate has developed in nearly level soils and in depressions that tend to accumulate water. This has resulted in reduction and movement of iron and in the appearance of mottles caused by resegregation of iron compounds.

Time

The length of time that the land surface has been exposed to soil-forming processes is an important factor in the formation of soil profiles. All soils require time for the development of distinct soil horizons. The influence of time, however, may be greatly modified by various soil-forming processes, particularly by erosion, by deposition of material on the soil surface, by relief, and by the type of parent material.

The parent materials of the soils in Summit County are of two general age groups—those of Wisconsin age and those formed in recent deposits on the flood plains. The oldest materials are those deposited by the Wisconsin glaciation 18,000 to 24,000 years ago (*18*).

The present flood plains are subject to deposition, and the soils show little differentiation of soil horizons. The major horizon in these soils is at the surface, where organic matter accumulates. Successive flooding and new deposition renews the cycle of soil formation at a new time.

Geological erosion on steep slopes has removed part of the soil as it formed and constantly exposes unaltered parent material to the other soil-forming factors. This is evident on the steep slopes along the Cuyahoga River. Frequent slips constantly remove the soil and expose unaltered parent material. This cycle occurs at such short intervals of time that the soils exhibit much more poorly defined horizons than soils on stable landscapes.

Plant and animal life

Summit County was generally covered with deciduous hardwood forest at the time of settlement. In his map of the vegetation of Ohio, Gordon (*6*) has placed most of the county in the mixed oak forest type, the steeper slopes along the Cuyahoga River Valley into the mixed mesophytic type, and the low-lying swamp areas, such as Copley Swamp, into the swamp forest type.

The mixed oak forest type was a mixture of white oak, black oak, and hickory. Most of the somewhat poorly drained, moderately well drained, and well drained soils occur in the area of this forest type. The mixed mesophytic forest consisted of broad-leaved, deciduous species; no single species was dominant. Ellsworth, Glenford, and Geeburg soils and Rough broken land occur in the area of this forest type. The swamp forest type was a mixture of American elm, black ash, white oak, silver maple, and red maple. Sebring and other poorly drained soils and

Carlisle and other organic soils occur in the area of this forest type.

Few differences in the soils in the county have been caused directly by differences in plant and animal life. The organic soils and some of the very poorly drained mineral soils show evidence of abundant marsh or bog vegetation in thick layers of organic-matter accumulation. Little is directly observable in the soils that can be directly traced to the effects of animal life. It is known, however, that various animals and organisms contribute large quantities of organic remains to soils and thus influence soil chemistry. Animal life and organisms are also responsible to some degree for aeration and mixing of soil materials.

In the last 150 years, man has begun to influence soil formation. Large areas of wet soils have been drained and aerated, soils have received tons of lime and fertilizer, and native woodland has been largely cleared and planted to other types of vegetation. Cutting and filling in many areas and laying down impermeable materials in other areas have accelerated erosion on many soils. Man's alteration of the soil-forming factors will result in eventual changes in the formation of the soils.

Processes of Soil Formation

Four soil-forming processes contributed to the formation of horizons in the soils of Summit County. These are additions, losses, transfers, and alterations. Some of the processes promote differences within a soil, others retard or preclude differences.

Additions to soils include additions of organic matter to the surface, additions of bases in the organic matter and in ground water, erosional deposition, and the addition of bases contained in lime and fertilizer. The dark-colored surface layer of soils such as the Olmsted and Lorain is evidence of the addition of organic matter. All of the soils have had at least a thin layer of organic accumulation, but in some places cultivation has largely destroyed this material. Plant nutrients, to some degree, are recycled from soil to plants and back to soil again in the form of litter or organic material. This occurs in all of the soils in the county. Soils such as the Chagrin, Lobdell, Orrville, and Holly periodically receive additions of soil material from flooding. Additions of lime and fertilizer to cultivated areas counteract, or may even exceed, normal losses of plant nutrients.

Soil losses occur as removal of bases through leaching, removal of plant nutrients by crops, and actual losses through erosion. One of the most significant losses in the soils of Summit County involves the leaching of carbonates. In soils on uplands, such as the Canfield, carbonates have been removed to a depth of 6 to 10 feet. Other minerals in the soil are broken down and are lost through leaching, but at a slower rate than the carbonates. The alteration of other minerals produces free iron oxides. These cause bright reddish or brownish colors in soils such as the Wooster and Wheeling. The mottling observed in all but the well-drained soils is caused by reduction and resegregation of the iron oxides as a result of periodic excess water or slowly permeable soil horizons.

The most significant transfers in the soils of Summit County involve transfers of colloidal material from the surface layer to deeper depths. The fine clays are suspended in percolating water moving downward from the surface layer. Seasonal drying or precipitation causes the fine clays to be deposited on the soil surface in cracks or root channels. Clay coatings of this kind are observable in soils such as the Wooster, Rittman, and Chili. Various sesquioxides are also transferred from the surface to lower horizons of most of the soils.

Transformations within the zone of weathering involves the transformation of feldspars, biotite, and other primary minerals. Most important of the transformations involves the formation of silicate clay materials. Illite and vermiculite are two of the most common clay minerals in the soils in Summit County. Kaolinite clay is an indicator of fairly intense weathering and occurs in minor amounts in most of the soils in the county.

Classification of Soils

Classification consists of an orderly grouping of soils according to a system designed to make it easier to remember soil characteristics and interrelationships. Classification is useful in organizing and applying the results of experience and research. Soils are placed in narrow classes for discussion in detailed soil surveys and for application of knowledge within farms and fields. The many thousands of narrow classes are then grouped into progressively fewer and broader classes in successively higher categories, so that information can be applied to large geographic areas.

The system of classifying soils currently used by the National Cooperative Soil Survey was developed in the early sixties (*11*) and was adopted in 1965 (*16*). It is under continual study.

The current system of classification has six categories. Beginning with the most inclusive, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. The criteria for classification are soil properties that are observable or measurable, but the properties are selected so that soils of similar genesis are grouped together. The placement of some soil series in the current system of classification, particularly in families, may change as more precise information becomes available.

Table 9 shows the classification of each soil series of Summit County by family, subgroup, and order, according to the current system.

The following description of the classification system does not define all of the criteria necessary for classification, but it does define soil properties used in classifying the soils of the county.

ORDER: Ten soil orders are recognized in this system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate between the soil orders are those that tend to give broad climatic groupings of soils. The exceptions are the Entisols and Histosols, which occur in many different climates. Five of the soil orders are recognized in Summit County. They are Entisols, Inceptisols, Mollisols, Alfisols, and Histosols.

Entisols are recent minerals soils in which there has been little if any horizon development. All of the Enti-

TABLE 9.—*Classification of soil series* [1]

Series	Current Classification		
	Family	Subgroup	Order
Berks	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols.
Bogart [2]	Fine-loamy, mixed, mesic	Aquic Hapludalfs	Alfisols.
Canadice	Fine, illitic, mesic	Typic Ochraqualfs	Alfisols.
Caneadea	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols.
Canfield	Fine-loamy, mixed, mesic	Aquic Fragiudalfs	Alfisols.
Carlisle	Euic, mesic	Typic Medisaprists	Histosols.
Chagrin [3]	Fine-loamy, mixed, mesic	Dystric Fluventic Eutrochrepts	Inceptisols.
Chili [2]	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Conotton	Loamy-skeletal, mixed, mesic	Typic Hapludalfs	Alfisols.
Damascus	Fine-loamy, mixed, mesic	Typic Ochraqualfs	Alfisols.
Dekalb	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols.
Ellsworth	Fine, illitic, mesic	Aquic Hapludalfs	Alfisols.
Fitchville	Fine-silty, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Frenchtown	Fine-loamy, mixed, mesic	Typic Fragiaqualfs	Alfisols.
Geeburg [2]	Fine, illitic, mesic	Aquic Hapludalfs	Alfisols.
Glenford	Fine-silty, mixed, mesic	Aquic Hapludalfs	Alfisols.
Haskins	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Holly [3]	Fine-loamy, mixed, nonacid, mesic	Typic Fluvaquents	Entisols.
Jimtown [2]	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Linwood	Loamy, mixed, euic, mesic	Terric Medisaprists	Histosols.
Lobdell	Fine-loamy, mixed, mesic	Fluvaquentic Eutrochrepts	Inceptisols.
Lorain	Fine, illitic, mesic	Mollic Ochraqualfs	Alfisols.
Loudonville	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols.
Luray	Fine-silty, mixed, mesic	Typic Argiaquolls	Mollisols.
Mahoning	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols.
Mitiwanga	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Olmsted	Fine-loamy, mixed, mesic	Mollic Ochraqualfs	Alfisols.
Orrville	Fine-loamy, mixed, nonacid, mesic	Aeric Fluvaquents	Entisols.
Oshtemo [2]	Coarse-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Ravenna	Fine-loamy, mixed, mesic	Aeric Fragiaqualfs	Alfisols.
Rittman	Fine-loamy, mixed, mesic	Aquic Fragiudalfs	Alfisols.
Sebring	Fine-silty, mixed, mesic	Typic Ochraqualfs	Alfisols.
Sloan [2]	Fine-loamy, mixed, mesic	Fluvaquentic Haplaquolls	Mollisols.
Tioga [2]	Coarse-loamy, mixed, mesic	Dystric Fluventic Eutrochrepts	Inceptisols.
Trumbull	Fine, illitic, mesic	Typic Ochraqualfs	Alfisols.
Wadsworth	Fine-silty, mixed, mesic	Aeric Fragiaqualfs	Alfisols.
Wallkill	Fine-loamy, mixed, nonacid, mesic	Thapto Histic Fluvaquents	Entisols.
Wheeling [2]	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols.
Willette	Clayey, illitic, euic, mesic	Terric Medisaprists	Histosols.
Wooster	Fine-loamy, mixed, mesic	Typic Fragiudalfs	Alfisols.

[1] Placement of some series in the system of classification, particularly in families and subgroups, may change as more precise information becomes available.
[2] These soils are taxadjuncts to the series. Reasons for differences in classification are given in the individual series descriptions.
[3] Chagrin silt loam, alkaline, and Holly silt loam, alkaline, are taxadjunct mapping units.

sols in this survey area are soils that formed in recent alluvium on flood plains.

Inceptisols are mineral soils in which horizons have started to develop, but which lack horizons that have a significant accumulation of illuvial clay.

Mollisols are mineral soils that have a dark-colored surface layer more than 10 inches thick and a base saturation of more than 50 percent.

Alfisols are mineral soils that have horizons of clay accumulation and a base saturation of more than 35 percent.

Histosols are organic soils that are saturated with water for long periods unless drained. They contain organic horizons that have a minimum thickness of 16 inches and a minimum organic-matter content of 20 percent.

SUBORDER: The orders are divided into suborders primarily on the basis of soil characteristics that produce classes having genetic similarity. The soil properties that separate suborders mainly indicate the presence or absence of a seasonal water table or other differences resulting from climate or vegetation. The suborders are not given on table 9, because they are indicated by the last two syllables in the subgroup name. Examples are Aqualfs, Udalfs, and Ochrepts.

GREAT GROUP: Suborders are separated into great groups according to the presence or absence of genetic horizons and the arrangement of these horizons. The horizons used to make separations are those in which clay or humus has acumulated or those that have pans that interfere with the growth of roots or the movement of water. Other features used include major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium) and the like. The great group is not indicated separately in table 9, because it is the last word in the name of the subgroup. Examples are Fragiaqualfs and Hapludalfs.

SUBGROUP: Great groups are subdivided into subgroups, one of which represents the central, or typic, concept of the group. Other subgroups are called intergrades because they have properties of more than one great group or one or more properties of another suborder or order. The Thapto subgroups are extragrades. They have one or more properties not common to any known kind of soil.

FAMILY: Families are established on the basis of soil properties that are important to the growth of plants or to the behavior of the soils when used for engineering purposes. Properties that are differentiated at the family level are texture, reaction, soil temperature, mineralogy, and others.

SERIES: A definition of the series concept is given in the section "How This Survey was Made." There are 40 soil series recognized in Summit County. Some of the soils in the county do not fit in a series that has been recognized in the classification system, but recognition of a separate series would not serve a useful purpose. Such soils are named for the series they strongly resemble, because they differ from those series in ways too small to be of consequence in interpreting their usefulness or behavior. Soil scientists designate such soils as taxadjuncts to the series for which they are named. In this survey, soils named in the Bogart, Chagrin, Chili, Geeburg, Holly, Jimtown, Sloan, Oshtemo, Tioga, and Wheeling series are taxadjuncts to those series.

TABLE 10.—*Physical and chemical*

[Analyses made by the Ohio Agricultural Research

Soil and sample number	Depth from surface	USDA textural class	Particle-size distribution					
			Very coarse sand (2 to 1 mm.)	Coarse sand (1.0 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.10 mm.)	Very fine sand (0.10 to 0.05 mm.)	Total sand
	Inches		*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Bogart loam, ST-26.	0-7	Loam	7.0	10.5	10.3	13.4	4.5	45.7
	7-13	Loam	5.7	11.6	10.8	13.4	4.4	45.9
	13-21	Sandy loam	10.3	12.7	11.1	14.4	5.2	53.7
	21-27	Coarse sandy loam	8.3	17.3	16.9	17.1	3.3	62.9
	27-33	Loamy sand	1.0	3.6	32.2	40.9	2.8	80.5
	33-40	Coarse sandy loam	22.1	25.7	15.5	9.2	2.3	74.8
	40-48	Coarse sand	2.2	31.2	39.4	11.6	1.6	86.0
	48-64	Sandy loam	1.5	17.6	39.2	17.2	1.1	76.6
	64-70	Coarse sandy loam	13.0	35.7	21.3	6.7	1.1	77.8
Canadice silt loam, ST-20.	0-3	Silty clay loam	2.3	1.4	2.0	5.2	2.3	13.2
	3-9	Silty clay loam	.7	2.4	3.2	8.4	3.5	18.2
	9-15	Silty clay	.9	1.7	2.5	6.9	2.8	14.8
	15-22	Clay	.1	.8	1.2	3.7	1.5	7.3
	22-30	Silty clay	.0	.3	.3	.6	.4	1.6
	30-38	Silty clay	.1	.1	.1	.2	.1	.6
	38-50	Silty clay	.1	.2	.2	.4	.2	1.1
Canfield silt loam, ST-5.	0-8	Silt loam	.8	2.3	2.9	4.6	5.7	16.3
	8-13	Silt loam	.6	1.9	3.2	5.6	6.0	17.3
	13-20	Loam	1.5	4.2	7.5	13.5	8.0	34.7
	20-26	Loam	2.3	5.1	9.0	16.0	8.3	40.7
	26-33	Loam	1.5	4.7	7.7	14.0	8.4	36.3
	33-44	Loam	2.8	5.2	6.8	12.8	8.4	36.0
	44-54	Loam	4.9	8.6	9.9	15.7	10.0	49.1
	54-79	Loam	5.1	7.5	9.3	17.9	11.6	51.4
Chili loam, ST-18.	0-7	Loam	2.6	9.3	11.3	12.0	5.1	40.3
	7-14	Gravelly loam	3.3	8.8	9.9	10.9	5.0	37.9
	14-23	Gravelly sandy loam	.4	18.5	17.1	15.0	3.9	60.9
	23-30	Gravelly coarse sandy loam	10.2	30.9	18.4	11.4	2.4	73.3
	30-42	Gravelly loamy sand	13.1	39.2	19.7	8.8	2.2	83.0
	42-50	Sand	.4	2.4	32.6	56.3	3.5	95.2
	50-60	Gravelly coarse sand	15.5	32.3	29.2	13.0	1.1	91.1
Frenchtown silt loam, ST-15.	0-10	Loam	.9	3.9	8.0	13.0	6.4	33.0
	10-17	Loam	.4	3.7	8.4	14.3	6.6	33.4
	17-23	Clay loam	.3	2.9	6.5	11.0	5.3	26.0
	23-32	Clay loam	.6	3.0	6.1	10.8	5.5	26.0
	32-38	Clay loam	2.0	5.2	8.0	12.5	6.2	33.9
	38-51	Loam	2.1	5.7	7.6	12.6	7.2	35.2
	51-62	Loam	2.0	4.2	6.2	11.1	7.5	31.0
	62-71	Loam	2.4	3.3	4.5	9.9	7.4	27.5
	71-86	Loam	1.8	2.6	4.2	10.1	7.1	25.8

Laboratory Data

Profiles of 11 of the major soil series in Summit County were sampled in the field for characterization analysis. One sample was taken from each of the representative horizons or layers in each soil for laboratory analysis. Data from the analyses are given in table 10. Detailed descriptions for each soil sampled are given in the section "Descriptions of the Soils."

The following paragraphs describe some of the procedures used to obtain the data presented on table 10.

Particle-size distribution was obtained by the pipette method outlined by Steele and Bradfield (*12*), but using sodium hexametaphosphate as the dispersing agent and a 10-gram soil sample. All pH measurements were made by using a 1:1 soil-water ratio. Percentage of organic matter was determined by a dry combustion method (*9*) and is reported as organic carbon. Calcium carbonate equivalent was determined by the procedure of Hutchinson and McLennan (*8*) and also by using the Chittick Apparatus (*5*). Exchangeable hydrogen (including titratable aluminum) was determined by the Triethanolamine method (*7*), and cation exchange capacities by the summation of exchangeable cations. Exchangeable calcium and magnesium were extracted according to Peech and others (*7*) and were determined by the method of Barrows and Simpson (*4*). Potassium was determined by flame photometry.

data for selected soils

and Development Center, Ohio State University]

Particle-size distribution—Con.			Reaction	Organic carbon	Calcium carbonate equivalent	Exchangeable cations (milliequivalents per 100 grams of soil)				Sum of exchangeable cations	Total bases	Base saturation
Silt (0.5 to 0.002 mm.)	Clay (less than 0.002 mm.)	Fine clay (less than 0.0002 mm.)				H	Ca	Mg	K			
Percent	*Percent*	*Percent*	*pH*	*Percent*	*Percent*					*Meq./100 gm. of soil*	*Meq./100 gm. of soil*	*Percent*
42.9	11.4	1.2	4.6	1.5	--------	7.8	0.3	0.3	0.27	8.7	0.9	10
41.4	12.7	2.5	4.8	.5	--------	6.8	.8	.3	.28	8.2	1.4	17
31.4	14.9	4.1	5.0	.3	--------	6.3	2.3	1.0	.24	9.8	3.5	36
21.0	16.1	4.6	4.9	.3	--------	6.8	1.9	1.3	.24	10.2	3.4	34
10.1	9.4	3.0	5.2	.2	--------	3.9	1.1	1.3	.19	6.5	2.6	40
14.4	10.8	3.0	5.2	.2	--------	4.4	1.1	1.5	.20	7.2	2.8	39
7.3	6.7	2.2	5.2	.2	--------	3.3	.7	.8	.15	4.9	1.6	33
8.9	14.5	6.9	5.5	.3	--------	3.7	3.9	1.6	.23	9.4	5.7	61
10.1	12.1	6.4	6.1	.8	--------	3.4	5.7	1.6	.20	10.9	7.5	69
51.4	35.4	11.9	4.4	12.4	--------	37.1	2.6	1.7	.46	41.9	4.8	11
49.5	32.3	8.1	4.8	1.5	--------	15.2	.5	.9	.14	16.7	1.5	9
42.7	42.5	18.1	5.0	.7	--------	12.3	1.8	4.3	.20	18.6	6.3	34
38.9	53.8	17.6	6.1	.3	--------	4.7	4.4	9.8	.23	19.1	14.4	75
41.2	57.2	18.0	7.5	--------	2.2	--------	--------	--------	--------	--------	--------	--------
45.0	54.4	16.0	7.9	--------	2.8	--------	--------	--------	--------	--------	--------	--------
44.2	54.7	15.4	7.9	--------	2.8	--------	--------	--------	--------	--------	--------	--------
69.3	14.4	2.5	5.0	.9	--------	7.9	2.6	.6	.22	11.3	3.4	30
58.9	23.8	9.8	5.0	.3	--------	7.7	5.2	1.2	.22	14.3	6.6	46
43.8	21.5	10.0	5.0	.2	--------	6.1	4.6	1.6	.20	12.5	6.4	51
39.7	19.6	8.0	4.9	.1	--------	6.9	3.8	2.0	.15	12.8	5.9	46
44.2	19.5	6.7	5.3	.1	--------	4.5	4.7	2.4	.13	11.7	7.2	62
45.7	18.3	5.5	6.0	.1	--------	4.1	5.6	2.5	.10	12.3	8.2	67
36.3	14.6	4.7	5.9	.1	--------	3.1	4.0	1.7	.09	8.9	5.8	65
35.5	13.1	4.2	6.1	.1	--------	3.3	3.2	1.5	.08	8.1	4.8	59
48.5	11.2	1.9	4.7	1.0	--------	10.8	.4	.4	.11	11.7	.9	8
48.6	13.5	3.7	4.9	.3	--------	7.3	1.2	.3	.20	9.0	1.7	19
20.1	19.0	11.3	4.9	.2	--------	8.1	3.3	.6	.14	12.1	4.0	33
9.8	16.9	10.2	5.1	.2	--------	7.4	3.6	.7	.16	11.9	4.5	38
4.6	12.4	7.0	5.2	.1	--------	4.7	2.6	1.0	.15	8.4	3.7	44
1.2	3.6	.8	5.6	.1	--------	1.1	.3	.3	.06	1.8	.7	38
4.6	4.3	2.8	5.6	.1	--------	2.1	1.5	.4	.08	4.1	2.0	49
46.5	20.5	6.6	6.9	1.7	--------	2.7	13.4	2.6	.14	18.8	16.1	86
45.1	21.5	8.0	6.2	.4	--------	5.1	7.9	1.3	.11	14.4	9.3	65
37.3	36.7	20.2	4.6	.4	--------	16.2	5.9	2.8	.21	25.1	8.9	35
40.5	33.5	15.2	4.4	.4	--------	14.5	3.7	3.0	.24	21.4	6.9	32
35.9	30.2	13.3	4.5	.2	--------	12.9	3.0	3.2	.18	19.3	6.4	33
39.5	25.3	11.8	4.7	.2	--------	10.4	3.7	4.4	.18	18.7	8.3	44
42.4	26.6	12.0	5.5	.2	--------	4.8	5.0	6.2	.14	16.1	11.3	70
48.8	23.7	8.3	6.1	.2	--------	4.1	5.0	5.7	.13	14.9	10.8	73
50.0	24.2	7.3	6.5	.2	--------	2.3	4.5	4.7	.12	11.6	9.3	80

TABLE 10.—*Physical and chemical*

Soil and sample number	Depth from surface	USDA textural class	Particle-size distribution: Very coarse sand (2 to 1 mm.)	Coarse sand (1.0 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.10 mm.)	Very fine sand (0.10 to 0.05 mm.)	Total sand
	Inches		*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Glenford silt loam, ST-27.	0-9	Silt	. 4	1. 0	1. 0	1. 9	1. 6	5. 9
	9-12	Silt loam	. 2	. 7	. 6	1. 2	1. 0	3. 7
	12-16	Silt loam	. 2	. 5	. 5	. 9	1. 1	3. 2
	16-21	Silt loam	. 2	. 6	. 6	1. 0	1. 3	3. 7
	21-29	Silt loam	. 1	. 6	. 6	1. 1	1. 5	3. 9
	29-40	Silt loam	. 2	. 8	. 8	1. 8	1. 9	5. 5
	40-60	Silt loam	. 1	. 3	. 3	. 8	1. 2	2. 7
	60-80	Silt	. 1	. 1	. 2	. 5	. 7	1. 6
	80-100	Silt	. 1	. 3	. 1	. 3	. 8	1. 6
Mahoning silt loam, ST-1.	0-6	Silt loam	1. 1	2. 9	5. 2	10. 5	6. 9	26. 6
	6-11	Silt loam	1. 0	2. 1	3. 8	8. 0	5. 9	20. 8
	11-17	Silty clay loam	. 9	2. 5	3. 3	6. 5	4. 8	18. 0
	17-24	Silty clay loam	1. 2	2. 9	3. 7	6. 9	5. 1	19. 8
	24-32	Clay loam	1. 7	2. 8	3. 5	7. 0	5. 3	20. 3
	32-46	Silty clay loam	1. 8	2. 7	2. 9	5. 9	4. 7	18. 0
	46-65	Silty clay loam	2. 4	3. 3	2. 9	5. 7	4. 8	19. 1
	65-73	Silty clay loam	1. 4	3. 4	3. 4	6. 6	5. 1	19. 9
Olmsted loam, ST-7.	0-8	Loam	2. 7	10. 3	11. 8	13. 1	6. 2	44. 1
	8-13	Loam	2. 3	10. 3	11. 5	14. 4	6. 0	44. 5
	13-21	Coarse sandy loam	8. 9	21. 0	15. 5	13. 2	4. 6	63. 2
	21-29	Coarse sandy loam	8. 1	27. 0	12. 7	7. 3	4. 1	59. 2
	29-32	Sandy clay loam	9. 5	21. 3	13. 5	8. 9	4. 1	57. 3
	32-41	Gravelly coarse sandy loam	16. 0	27. 7	12. 2	10. 2	4. 4	70. 5
	41-60	Sandy clay loam	7. 3	33. 7	16. 6	4. 1	2. 7	64. 4
Oshtemo sandy loam, ST-21.	0-9	Sandy loam	2. 2	14. 0	18. 7	24. 5	5. 5	64. 9
	9-16	Sandy loam	3. 0	20. 2	17. 5	14. 4	3. 7	58. 8
	16-24	Coarse sandy loam	4. 9	29. 8	26. 2	10. 8	2. 2	73. 9
	24-29	Loamy coarse sand	5. 2	34. 2	31. 6	14. 8	1. 5	87. 3
	29-35	Coarse sand	3. 8	34. 0	31. 2	17. 5	2. 2	88. 7
	35-42	Loamy coarse sand	11. 8	25. 8	24. 9	14. 8	4. 4	81. 7
	42-53	Coarse sand	4. 2	42. 5	31. 9	15. 6	1. 0	95. 2
	53-75	Coarse sand	16. 2	46. 5	22. 3	6. 6	. 9	92. 5
Wadsworth silt loam, ST-24.	0-8	Silt loam	2. 5	3. 2	2. 8	6. 6	5. 7	20. 8
	8-14	Silt loam	. 8	1. 6	2. 6	6. 6	6. 4	18. 0
	14-23	Clay loam	1. 7	2. 6	2. 9	7. 1	6. 4	20. 7
	23-29	Silty clay loam	1. 6	2. 4	2. 8	5. 2	4. 5	16. 5
	29-35	Silty clay loam	1. 6	2. 5	3. 2	5. 8	4. 6	17. 7
	35-44	Silty clay loam	1. 8	2. 5	3. 0	5. 8	4. 6	17. 7
	44-54	Silty clay loam	1. 5	2. 5	2. 7	5. 2	4. 2	16. 1
	54-70	Silty clay loam	2. 7	2. 7	2. 8	5. 6	4. 5	18. 3
	70-80	Silty clay loam	2. 7	3. 0	3. 0	5. 6	4. 4	18. 7
Wheeling silt loam, ST-6.	0-3	Silt loam	1. 4	2. 9	3. 8	5. 5	7. 4	21. 0
	3-10	Silt loam	. 2	1. 8	3. 0	3. 7	5. 9	14. 6
	10-14	Silt loam	. 2	1. 5	2. 7	3. 1	5. 6	13. 1
	14-22	Silt loam	. 2	1. 5	2. 8	3. 4	5. 8	13. 7
	22-31	Silt loam	. 2	2. 1	4. 9	6. 3	8. 4	21. 9
	31-35	Silt loam	. 2	3. 0	8. 0	10. 1	8. 4	29. 7
	35-39	Sandy loam	1. 2	10. 4	19. 3	21. 9	5. 9	58. 7
	39-49	Sandy loam	3. 3	14. 1	21. 7	24. 2	6. 1	69. 4
	49-60	Sandy loam	2. 4	11. 7	23. 8	30. 7	5. 6	74. 2

data for selected soils—Continued

Particle-size distribution—Con.			Reaction	Organic carbon	Calcium carbonate equivalent	Exchangeable cations (milliequivalents per 100 grams of soil)				Sum of exchangeable cations	Total bases	Base saturation
Silt (0.5 to 0.002 mm.)	Clay (less than 0.002 mm.)	Fine clay (less than 0.0002 mm.)				H	Ca	Mg	K			
Percent	*Percent*	*Percent*	*pH*	*Percent*	*Percent*					*Meq./100 gm. of soil*	*Meq./100 gm. of soil*	*Percent*
82.6	11.5	1.1	6.4	1.6	--------	5.2	6.3	.7	.10	12.3	7.1	58
80.4	15.9	2.7	5.4	.5	--------	5.6	2.3	.5	.08	8.5	2.9	34
75.9	20.9	6.0	5.2	.3	--------	7.2	3.4	.9	.08	11.6	4.4	38
75.1	21.2	6.6	5.4	.3	--------	6.3	4.3	1.6	.09	12.3	6.0	49
75.1	21.0	6.6	5.6	.3	--------	5.0	5.0	2.0	.10	12.1	7.1	59
77.0	17.5	5.1	6.4	.3	--------	3.7	5.8	2.3	.10	11.9	8.2	69
80.1	17.2	5.5	6.7	.2	--------	2.8	6.4	2.3	.13	11.6	8.8	76
92.5	5.9	1.4	7.7	--------	.1	--------	--------	--------	--------	--------	--------	--------
88.3	10.1	2.7	8.1	--------	5.6	--------	--------	--------	--------	--------	--------	--------
53.3	20.1	4.4	6.3	2.1	--------	6.5	6.6	2.2	.19	15.5	9.0	58
54.2	26.0	5.5	5.2	.7	--------	8.1	3.8	1.0	.14	13.0	4.9	38
44.0	38.0	13.3	4.8	.5	--------	12.7	4.6	1.1	.19	18.6	5.9	32
43.1	37.1	11.7	5.2	.3	--------	9.8	8.8	1.2	.22	20.0	10.2	51
45.7	34.0	10.9	7.0	--------	--------	2.9	13.9	1.4	.19	18.4	15.5	84
51.6	30.4	7.4	7.4	--------	13.7	--------	--------	--------	--------	--------	--------	--------
51.6	29.3	6.4	7.8	--------	16.5	--------	--------	--------	--------	--------	--------	--------
50.0	30.1	7.9	7.8	--------	17.3	--------	--------	--------	--------	--------	--------	--------
43.0	12.9	4.1	4.8	3.4	--------	15.3	3.9	.4	.24	19.8	4.5	23
40.8	14.7	3.6	4.9	.4	--------	4.7	3.0	.9	.13	8.7	4.0	46
23.6	13.2	3.8	4.9	.4	--------	4.4	3.4	.3	.10	8.2	3.8	46
24.7	16.1	5.7	4.8	.4	--------	5.4	4.2	.6	.18	10.4	5.0	48
22.5	20.2	9.3	5.2	.3	--------	5.6	7.1	.7	.24	13.6	8.0	59
16.4	13.1	5.2	5.4	.3	--------	4.1	5.1	.6	.20	10.0	5.9	59
14.0	21.6	11.9	6.2	.3	--------	5.1	7.4	.9	.28	13.7	8.6	63
25.6	9.5	1.5	6.6	1.3	--------	4.5	4.1	.6	.14	9.3	4.8	52
30.6	10.6	2.2	6.3	.3	--------	3.5	2.1	.4	.10	6.1	2.6	43
15.4	10.7	3.3	5.9	.1	--------	3.1	2.1	.6	.13	5.9	2.8	48
6.0	6.7	2.3	5.6	.1	--------	2.6	1.5	.5	.08	4.7	2.1	44
5.4	5.9	2.2	5.3	.1	--------	2.0	1.4	.6	.10	4.1	2.1	51
9.2	9.1	3.7	5.3	.2	--------	4.4	1.4	.5	.11	6.4	2.0	31
1.2	3.6	1.5	5.3	.1	--------	2.2	.9	.3	.06	3.5	1.3	36
3.9	3.6	1.5	6.4	.1	--------	1.8	1.8	.5	.88	4.2	2.4	57
59.0	20.2	6.4	5.0	2.2	--------	13.6	3.7	.6	.33	18.2	4.6	25
57.8	24.2	6.4	4.6	.4	--------	11.2	1.9	.6	.19	13.9	2.7	19
46.1	33.2	14.6	4.6	.2	--------	13.5	3.9	1.4	.29	19.1	5.6	29
50.9	32.6	12.6	5.1	.3	--------	10.8	7.2	2.5	.25	20.7	9.9	48
54.2	28.1	7.7	6.0	.3	--------	5.5	10.2	2.7	.18	18.6	13.2	70
55.2	27.1	8.4	6.7	.4	--------	4.2	10.5	2.5	.17	17.4	13.2	76
54.5	29.4	6.9	7.6	--------	1.6	--------	--------	--------	--------	--------	--------	--------
53.4	28.3	6.9	7.9	--------	8.4	--------	--------	--------	--------	--------	--------	--------
53.5	27.8	6.3	7.9	--------	9.2	--------	--------	--------	--------	--------	--------	--------
67.8	11.2	1.0	5.6	4.2	--------	9.5	9.3	2.1	.51	21.4	11.9	56
70.8	14.6	2.5	5.5	.7	--------	7.8	2.8	.7	.22	11.5	3.7	32
67.9	19.0	4.4	6.1	.4	--------	8.4	2.5	.5	.20	11.6	3.2	28
63.7	22.6	8.1	4.7	.3	--------	10.6	2.0	.3	.18	13.1	2.5	19
55.9	22.2	11.0	4.5	.3	--------	11.9	1.0	1.2	.23	14.3	2.4	17
53.7	16.6	9.0	4.5	.3	--------	10.9	.3	1.5	.21	12.9	2.0	16
30.6	10.7	5.1	4.6	.3	--------	6.8	.3	.9	.18	8.2	1.4	17
21.1	9.5	4.8	4.6	.3	--------	5.6	.4	1.1	.15	7.2	1.6	23
16.9	8.9	5.0	4.7	.2	--------	4.4	1.0	1.2	.15	6.7	2.3	35

In addition to the data given in table 10, the results of mechanical analysis are available for soils in the following series: Bogart, Canfield, Chagrin, Chili, Fitchville, Haskins, Jimtown, Lorain, Loudonvile, Luray, Ravenna, Rittman, Sebring, Wadsworth, and Wooster. These data are on file at the Agronomy Department, Ohio State University, Columbus, Ohio, and the Ohio Department of Natural Resources, Division of Lands and Soil, Columbus, Ohio. Additional physical and chemical data for the Chili, Dekalb, Fitchville, Luray, Wheeling, and Wooster series are in the published soil survey for Stark County, Ohio.

Additional Facts About the County

This section contains information about the history, climate, topography and drainage, geology and mineral resources, farming, and transportation of Summit County.

History

Development of the area that is now Summit County began long before the appearance of white settlers. The Cuyahoga and Tuscarawas Rivers were among the best routes for travel by canoe or boat from the Great Lakes to the Ohio River. A portage of only a few miles through the Akron area made this a major crossing point in the wilderness (*3*). Its location and description was noted by the early French traders.

The inhabitants of the Summit County area, at the time of first contact with European settlers, were the Erie Indians. These were driven out in the mid-17th century by strong Iroquois tribes in search of new fur territory. During the prerevolutionary period, the major resource of the area was furs taken by the Indians. The Portage Lakes district was noted by several travelers as an especially good hunting area. Indian settlements were noted at Nesmuth Lake and along the Cuyahoga River at Yellow Creek. Crops of squash and corn were planted along the Cuyahoga River.

Farming was the primary occupation during the pioneer period from 1790 to about 1820. Most farm produce was used to sustain the local community, partly because markets were so distant and difficult to reach.

To bring markets and farmers closer, construction of the Ohio canal system from the Ohio River to Lake Erie was begun in the 1820's. The canal crossed the divide at the present location of Akron.

The period from 1840 to 1910 is linked to the development of railroad transportation. The opening of this period was marked by the formation of Summit County from parts of Medina, Portage, and Stark Counties in 1840. Farming turned from the production of grain and livestock to dairy products. Summit County is a part of the northeast dairy-general farm region (*15*). Expansion of cities during this period provided a ready market for fresh milk, cheese, butter, and other dairy products. The decline of grain farming is also attributed to increased competition from the fertile new farms of the Midwest.

With the advent of the First World War and the growth of automotive travel, the production of rubber at Akron rapidly expanded and new companies formed. Beginning with the Second World War, the expansion of industry was characterized by diversification of products and decentralization of plants. Highway transport became increasingly important and has generated a major new industry—trucking—with many terminals and warehouses in Akron and in Summit County.

Most of the major rubber companies now have divisions that produce plastics and other synthetic materials. Machinery and chemical manufacturing are concentrated in Barberton. The cities of Cuyahoga Falls, Stow, Tallmadge, and Norton are rapidly growing residential suburbs of Akron.

In northern Summit County the growth of Cleveland suburbs is reaching into Twinsburg, Macedonia, and Richfield. Industrial plants have also moved into these suburban areas as part of the decentralization process.

Climate[4]

The data in table 11 indicate the wide ranges of temperature that are characteristic of Summit County. Northwesterly to westerly winds blowing off Lake Erie tend to lower temperatures in summer and raise them in winter. When winds are from other directions, the lake has little effect on temperatures within the county. Winters are mostly cold and cloudy. On an average of 4 days each year, the temperature falls below zero. Summers are moderately warm and humid. On an average of 8 days annually, temperatures are in the nineties. Temperatures in the urban areas are warmer than in rural areas in all seasons of the year.

Winds blowing from Lake Erie in winter often bring heavy snow squalls, sometimes as late as mid-May. Average annual snowfall in the county decreases southward from Lake Erie. It is about 72 inches in the extreme north and 42 inches in the south.

The dates of selected temperatures in spring and in fall may vary considerably from those dates shown in table 12, because the terrain of Summit County is rolling. Sebring, Canadice, Carlisle, Chagrin, Holly, and other soils in valleys generally have the latest freezes in spring and the earliest in fall because cool air drains down the slopes into the valleys on clear nights. Soils such as the Ellsworth, Mahoning, Rittman, Wadsworth, Canfield, and Wooster have the longest growing seasons. Light frost forms in places when the temperature about 5 feet above the ground is as high as 36° F.

As is characteristic of a continental climate, precipitation in Summit County varies widely from year to year. It is normally abundant, however, and well distributed. Fall is the driest season. In an average year, 0.01 inch of precipitation falls on 153 days, 0.10 inch or more on 75 days, 0.50 inch or more on 21 days, and 1 inch or more on 5 days. Thunderstorms occur on about 40 days each year. In a 24-hour period, a heavy rain of 2.0 inches can be expected at least once every 2 years, 2.7 inches at least once every 5 years, 3.2 inches at least once every 10 years, 3.8 inches at least once every 25 years, 4.2 inches at least once every 50 years, and 4.7 inches at least once every 100 years.

[4] By MARVIN E. MILLER, climatologist for Ohio, National Weather Service, U.S. Department of Commerce.

TABLE 11.—*Temperature and precipitation data*

[Data from Akron-Canton Airport; elevation, 1,208 feet]

Month	Average temperature				Precipitation				
	Daily maximum	Daily minimum	Monthly maximum	Monthly minimum	Average monthly total	One year in 10 will have— Less than—	One year in 10 will have— More than—	Average monthly snowfall	Average number of days with 1 inch or more of snow cover
	° F.	° F.	° F.	° F.	Inches	Inches	Inches	Inches	
January	34	19	55	−2	3. 18	1. 16	5. 63	10. 0	3
February	37	20	58	0	2. 43	1. 20	3. 85	8. 7	3
March	44	26	69	9	3. 34	1. 51	5. 51	9. 6	3
April	58	37	78	21	3. 56	2. 07	5. 23	2. 7	1
May	70	47	85	32	3. 23	1. 61	5. 11	. 2	(1)
June	79	56	91	42	3. 26	1. 55	5. 25	0	0
July	83	61	91	49	3. 95	1. 64	6. 71	0	0
August	81	59	90	47	2. 93	1. 42	4. 66	0	0
September	74	52	89	37	2. 41	. 83	4. 34	0	0
October	64	42	80	28	2. 12	. 49	4. 23	. 6	(1)
November	49	32	69	14	2. 47	1. 13	4. 05	5. 5	2
December	36	22	59	1	2. 29	. 89	3. 99	10. 3	3
Year	59	39	93	−6	35. 17	27. 16	43. 78	47. 6	15

[1] Less than one-half day.

Between 1929 and 1968, extended periods of moderate to extreme drought (based on Palmer Drought Severity Index) occurred in the growing sasons of 1930-1936, 1953, 1954, 1962, and 1963. The longest continuing period of moderate drought was 32 months, from July 1930 to February 1933.

Except for small grain and hay, crops generally are planted during the period May through early June. During a 10-year period, weekly rainfall amounts in excess of 1.2 inches can be expected to occur 10 times in May and 12 times in June. Rainfall this heavy delays fieldwork and causes soil loss, because in these months vegetative cover is lacking.

On most days in summer, relative humidity in the afternoon ranges from 50 to 60 percent. For the year, relative humidity averages about 80 percent at 1 a.m. and 7 a.m., 60 percent at 1 p.m., and 65 percent at 7 p.m. On the average in Summit County, there are 70 clear days (0 to 30 percent cloudiness), 106 partly cloudy days (30 to 70 percent cloudiness), and 189 cloudy days (more than 70 percent cloudiness). Heavy fog that reduces visibility to less than one-fourth mile is most frequent during the cold part of the year. Prevailing winds are from the south throughout the year, and the average speed of these winds is about 10 miles per hour. Since 1900, six tornadoes have been reported in Summit County. Damaging winds of 35 to 85 miles per hour occur most often in spring and summer and generally are associated with migrating thunderstorms.

Moisture levels in the soils of the county fluctuate seasonally, mostly independent of the amount of precipitation received. The moisture content is lowest in October and is replenished during winter and spring, when precipitation exceeds water loss by evaporation. Moisture needs of most crops are greatest in July and August, and rainfall is generally insufficient at that time to meet the needs; therefore, the soils dry out progressively.

TABLE 12.—*Probabilities of last freezing temperatures in spring and first in fall*

[Data from Akron-Canton Airport; elevation, 1,208 feet]

Probability	Dates for given probability and temperature				
	16° F. or lower	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower
Spring:					
1 year in 10 later than	April 4	April 9	April 23	April 28	May 19
2 years in 10 later than	March 30	April 5	April 18	April 24	May 12
5 years in 10 later than	March 18	March 25	April 8	April 16	May 1
Fall:					
1 year in 10 earlier than	November 14	November 4	October 29	October 19	September 30
2 years in 10 earlier than	November 19	November 9	November 3	October 23	October 5
5 years in 10 earlier than	November 29	November 20	November 13	November 1	October 11

Topography and Drainage

Summit County was named for the position that it occupies at the summit of a major water divide. The southern part of the county is drained by the Tuscarawas River, which is a part of the Muskingum and Ohio River systems. The part of the county north of Akron is drained into Great Lakes Basin through the Cuyahoga River and its tributaries.

The entire county lies within the glaciated Allegheny Plateau region. The topography of southern Summit County is a series of glacial till-covered plateaus and intervening outwash-filled valleys. Elevations of the plateau are between 1,100 and 1,200 feet. The valley outwash lies at an elevation of about 950 to 1,000 feet. The northern part of the county has similar upland areas, but the relief is greater because the old valley fill has been dissected by the Cuyahoga River and its tributaries. Steep land along both sides of the valley has the greatest relief in the county. The flood plain of the river gradually rises from about 600 feet above sea level at the county line to as much as 750 feet near Akron. Bluffs overlooking the valley are about 850 to 1,000 feet in elevation. Tributaries of the Cuyahoga River flow in steep-walled ravines. Waterfalls are at the head of some of these ravines; the falls of the Cuyahoga is a good example. Other falls occur in Brandywine Creek, Boston Run, Tinkers Creek, and Yellow Creek.

The highest point in Summit County is 1,320 feet above sea level and is near West Richfield. The lowest point is about 8 miles away, along the Cuyahoga River where the river leaves the county.

Geology and Mineral Resources

The land surface of Summit County is dominated by glacial deposits of Wisconsin age. The more recent alluvial or organic deposits are on river flood plains and in swamps. Bluffs of the much older underlying bedrock are scattered about the county.

Glacial till of three different periods covers much of the upland area in the county. The Hiram till of Cary age covers the northern third of the county. An extensive end moraine in Bath and Northampton Townships, and less pronounced in Stow Township, marks the terminus of this last glaciation. A segment of the Defiance moraine marks a minor re-advance into the Cuyahoga Valley in the vicinity of Boston and Northfield. The material of the Hiram till is compact, fine-grained, calcareous silty clay loam that is relatively free of pebbles and cobblestones. Texture is typically about 20 percent sand, 44 percent silt, and 36 percent clay. This till deposit is about 20 to 30 feet thick and overlies bedrock or earlier glacial tills. Most of the rest of Summit County is covered by the Mogadore till that contains a high proportion of sand. Five samples from the county are 45 to 58 percent sand, 30 to 36 percent silt, and 11 to 20 percent clay. This material is believed to be of early Wisconsin age because the depths of oxidation are greater and leaching and alteration are more pronounced than in the surrounding Wisconsin-age deposits (*18*).

In the southeastern corner of the county, a segment of the Grand River lobe of glaciation occurs in Green and Springfield Townships. This loamy material is called Kent till. Most of it in Summit County is on kamy end moraine with significant amounts of gravel contained in the kames. Analyses of samples from Kent till in Portage County show an average of 31 percent sand, 46 percent silt, and 23 percent clay.

Associated with these three major deposits of glacial till are extensive areas of valley train and kames composed mainly of sand and gravel. These occupy about half of the southern part of the county. North of the major drainage divide that crosses the county, glacial meltwater deposits of Wisconsin age are lacustrine and deltaic sediments accumulated in old preglacial valleys. These sediments are highly sorted, plastic clays, silts, and fine sand. All these materials are interbedded and difficult to identify as continuous strata or formations.

Mineral resources associated with these glacial deposits are made up chiefly of the large volumes of sand and gravel in the kame-moraines and valley trains of southern Summit County. A few sand and gravel pits are along the Cuyahoga River in deltaic deposits and in isolated kames throughout the northern part of the county, but most pits are in and south of Akron.

Some of the best supplies of ground water are in the permeable outwash material that fills the buried valleys. Recharge is restricted in some aquifers by deposits of fine-grained material. Salt contamination is becoming a problem in some areas (*19*).

The rock stratigraphy of Summit County is basically horizontal beds that dip gently to the east and south. The rocks exposed at the surface are Pennsylvanian, Mississippian, and Devonian in age. The youngest rock appears in the southeastern part of the county. Here, the Pottsville Formation is composed of alternating layers of shale, clay, sandstone, limestone, and coal. The shale, clay, and coal of this formation were the basis for early industrial development in Summit County. Shaft mining of coal began in the early pioneer days and thrived until after World War I, when natural gas became available for heating. Franklin and Green Townships were the center of most of this mining. Some strip mining has taken place in the extreme southeastern part of Green Township.

The lowermost member of the Pottsville Formation is a medium-grained, loosely cemented sandstone that contains many quartz pebbles. It is called Sharon conglomerate. This well-known member crops out as spectacular ledges in Boston Township and in the gorge at Cuyahoga Falls. It is also noticeable in many areas of northern Summit County. This nearly pure quartz sand is being used as a source of silica products at Barberton.

The Sharon member lies unconformably on Mississippian shales of the Cuyahoga group. This group of shales and sandstones averages 250 feet in thickness and lies beneath a cap of Sharon conglomerate or glacial till in most of the county. Brandywine Gorge, above the falls, and certain locations along the Cuyahoga valley below the falls offer good exposures of these rocks.

A massive, fine-grained sandstone that was once extensively used for building and millstones crops out at Peninsula, at Brandywine Falls, and in Sagamore Hills. This is the Berea sandstone. It crops out in the walls

of the Cuyahoga valley north of Peninsula. Cropping out farther north along the river are the Chagrin and Orio shales of Devonian age.

Farming

Farming is no longer the major land use in Summit County; urbanization has taken its place. The sharp decline in farming is indicated by comparing the census figures of 1945 and 1964. In 1945, 2,881 farms in the county accounted for 48.3 percent of the land area. By 1964, 546 farms occupied less than 16 percent of the county. Dairying is the major enterprise on most farms of commercial size in the county. Crops grown on these farms include legume-grass forages, corn for silage or grain, oats, and wheat. Nearly all of the remaining dairy farms are in the southern part of the county. Dairy operations in other parts of the county have been abandoned because of high property values and taxes.

Several commercial orchards are in Richfield and Northampton Townships. Major fruits are apples, peaches, pears, and plums. A few vineyards of Concord grapes are also cultivated. In the vicinity of Akron, vegetable production on some soils is competing with urban uses of the land. Irrigation is used on some of these crops. Growers of turf sod are using the organic soils for production of an annual crop of grass sod. The main vegetables grown on the organic soils are onions, radishes, and lettuce. Some potatoes are grown, under irrigation, on well-drained soils. Sweet corn, tomatoes, beans, peppers, and pumpkins are the crops on the flood plains of the Cuyahoga River.

More than half of the farms in Summit County are operated on a part-time basis by those who earn much of their income at another job or have retirement income. Cash-grain farming is common on these smaller farms.

Transportation

As a major metropolitan and industrial center, the city of Akron and Summit County in general have a complex network of railroads, highways, and airways. Four railroads serve Akron and Summit County, and several interstate highways have recently been constructed. The Ohio Turnpike crosses the county on the north, Interstate 80–S passes just south of Akron, and Interstate 77 links the area with Cleveland and Canton. Interstate 271, a major link between I–71 and I–90, crosses the northern part of the county. The Cuyahoga Valley between Akron and Cleveland has long been an obstacle in the development of major east-west arteries across northern Summit County. The Ohio Turnpike, State Route 82, and I–271 are the only major highways that cross the valley.

A thriving trucking industry in Summit County has terminals in Richfield and in southeast Akron.

Akron Municipal Airport is within the city limits and serves mainly private and corporate aircraft. The Akron-Canton Airport, in the southeastern corner of the county, is the commercial airline center.

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Glossary

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Base saturation. The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Channery soil. A soil that contains thin, flat fragments of sandstone, limestone, or schist, as much as 6 inches in length along the longer axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinegr, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic-matter content and clay but is rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is hard or very hard and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Glacial outwash (geology). Cross-bedded gravel, sand, and silt deposited by melt-water as it flowed from glacial ice.

Glacial till (geology). Nonsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Lacustrine deposit (geology). Material deposited in lake water and exposed by lowering of the water level or elevation of the land.

Leaching. The removal of soluble materials from soils or other material by percolating water.

Mineral soil. Soil composed mainly of inorganic (mineral) material and low in content of organic matter. Its bulk denity is greater than that of organic soil.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Types are these: Terminal, lateral, medial, ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineralogical and biological properties of the various horizons, and their thickness and arrangement in the soil profile.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest

dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Muck. An organic soil consisting of fairly well decomposed organic material that is relatively high in mineral content, finely divided, and dark in color.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Organic soil. A general term applied to a soil or to a soil horizon that consists primarily of organic matter, such as peat soils, muck soils, and peaty soil layers. In chemistry, organic refers to compounds of carbon.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid*, and *very rapid.*

pH value. A numerical means for designating acidity and alkalinity in soils. A pH value of 7.0 indicates precise neutrality; a higher value, alkalinity; and a lower value, acidity.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles, less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *Very coarse sand* (2.0 to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter). The separates recognized by the International Society of Soil Science are as follows: I (2.0 to 0.2 millimeter); II (0.2 to 0.02 millimeter); III (0.02 to 0.002 millimeter); IV (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay*, and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil. A presumed fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

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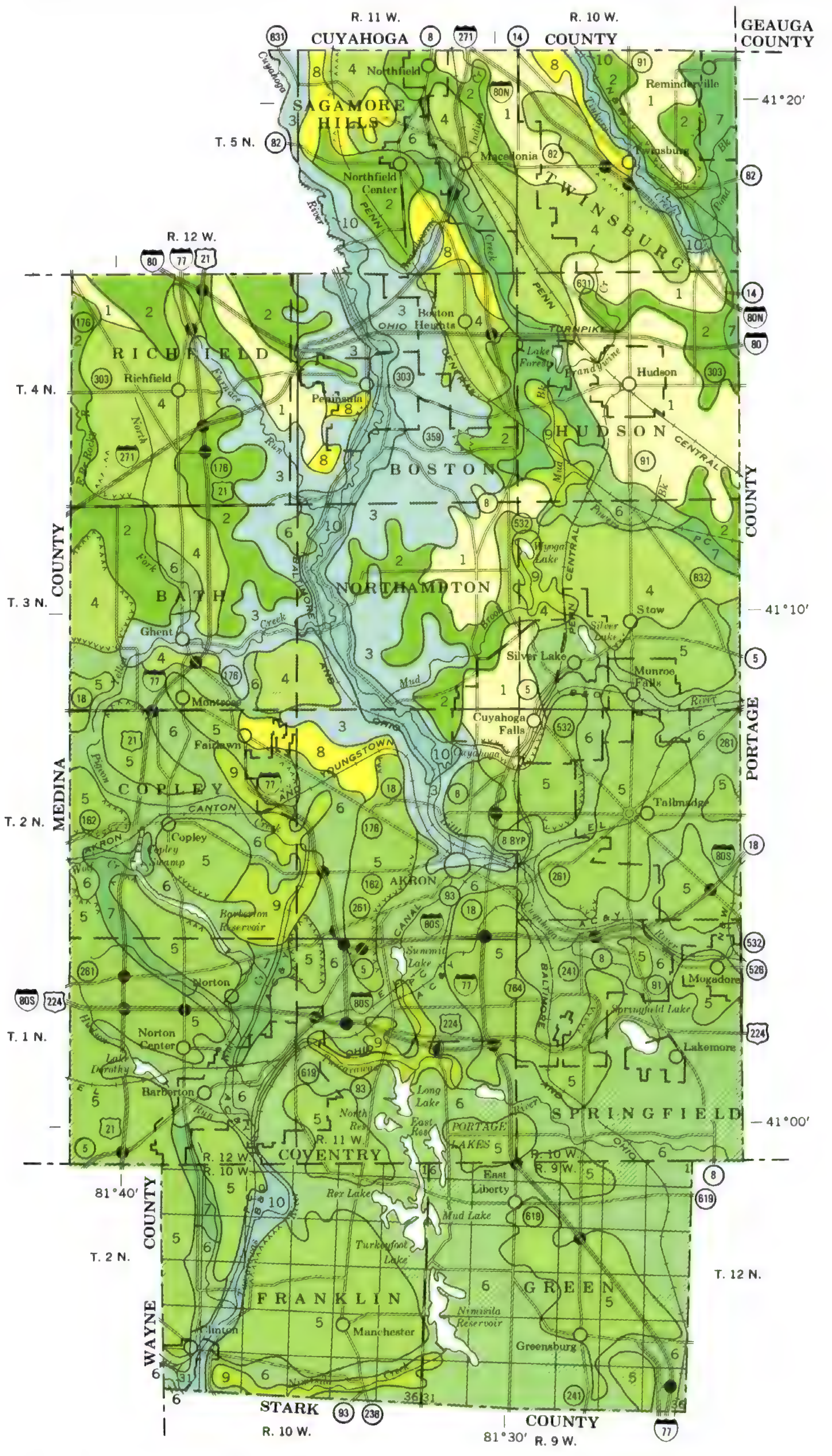


SOIL ASSOCIATIONS

1	Mahoning-Ellsworth association: Nearly level to gently sloping, somewhat poorly drained and moderately well drained soils formed in moderately fine textured glacial till
2	Ellsworth-Mahoning association: Gently sloping to steep, moderately well drained and somewhat poorly drained soils formed in moderately fine textured glacial till
3	Rough broken land association: Very steep land types and soils
4	Rittman-Wadsworth association: Nearly level to moderately steep, moderately well drained and somewhat poorly drained soils that have a fragipan; formed in medium-textured and moderately fine textured glacial till
5	Canfield-Wooster association: Gently sloping to moderately steep, moderately well drained and well drained soils that have a fragipan; formed in medium-textured glacial till
6	Chili association: Nearly level to steep, well-drained soils formed in sandy and gravelly glacial outwash
7	Sebring-Canadice association: Nearly level, poorly drained soils formed in silty and clayey lacustrine material
8	Glenford-Fitchville association: Nearly level to moderately steep, moderately well drained and somewhat poorly drained soils formed in silty lacustrine material
9	Carlisle association: Nearly level, very poorly drained soils formed in organic material
10	Chagrin-Holly-Lobdell association: Nearly level, well drained, poorly drained, and moderately well drained soils formed in medium-textured recent alluvium
vvvvvvvv	Narrow areas of Loudonville and Dekalb soils and prominent escarpments

Compiled 1972

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF LANDS AND SOIL
OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER

GENERAL SOIL MAP

SUMMIT COUNTY, OHIO

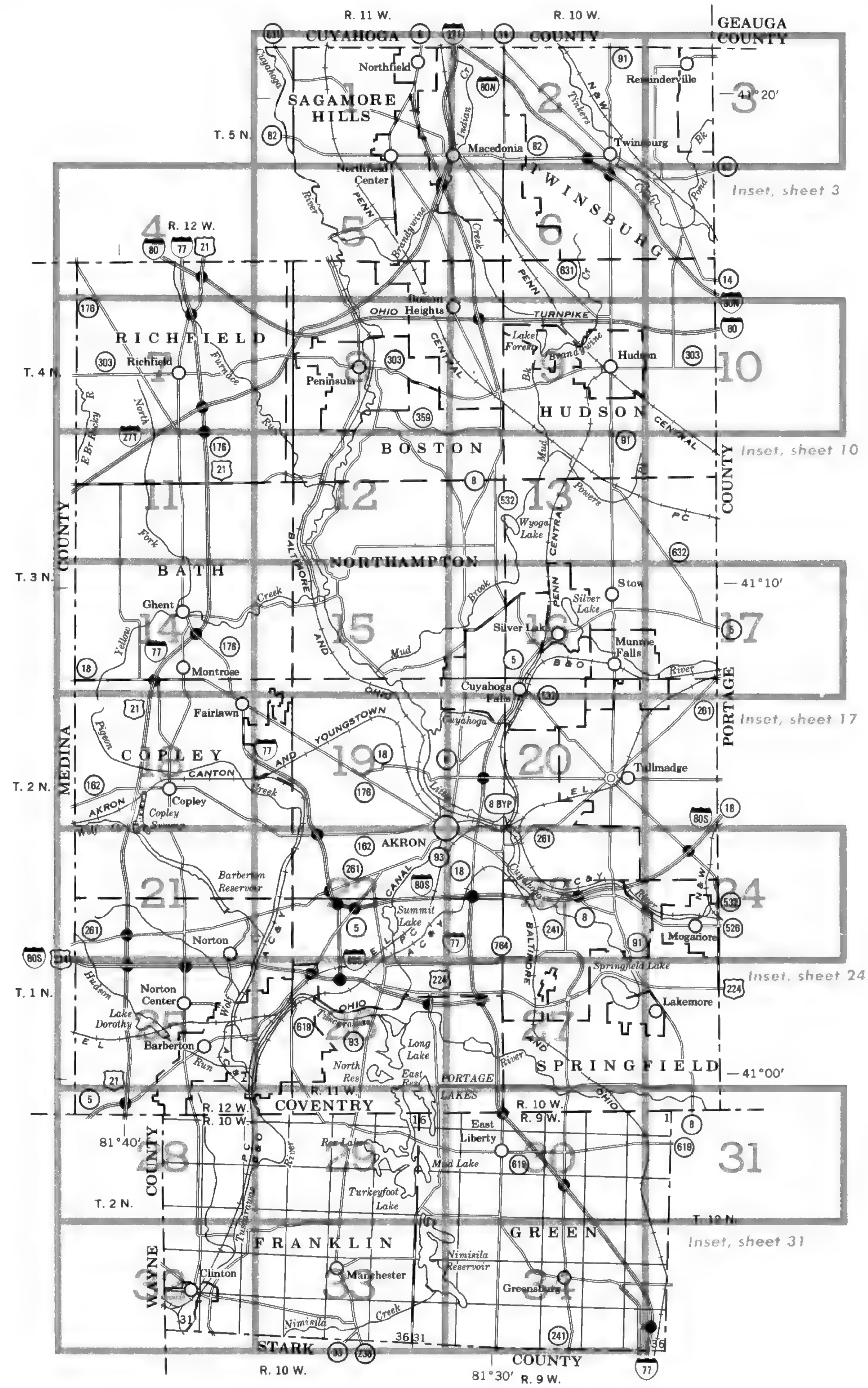
Scale 1:190,080

1 0 1 2 3 4 Miles

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

SUMMIT COUNTY, OHIO

Scale 1:190,080

1 0 1 2 3 4 Miles

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. In referring to a capability unit or a woodland suitability group, read the introduction to the section it is in for general information about its management. Other information is given in the subsection "Irrigation" and in tables as follows:

Estimated yields, table 1, p. 16.
Engineering uses of the soils, tables 4, 5, and 6, pp. 28 through 49.

Use of soils in town and country planning, table 7, p. 50.
Acreage and extent, table 8, p. 61.

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group
			Symbol	Page	Symbol
BeF	Berks channery silt loam, 25 to 70 percent slopes	62	VIIe-1	14	3f1
BgA	Bogart loam, 0 to 2 percent slopes	63	IIs-1	11	2o1
BgB	Bogart loam, 2 to 6 percent slopes	63	IIe-1	9	2o1
BhB	Bogart-Haskins loams, 2 to 6 percent slopes	64	IIe-1	9	2o1
Bp	Borrow pits	64	------	--	4
Ca	Canadice silty clay loam	65	IVw-1	14	2w1
CcA	Caneadea silt loam, 0 to 2 percent slopes	65	IIIw-3	12	2w2
CcB	Caneadea silt loam, 2 to 6 percent slopes	65	IIIw-3	12	2w2
CdA	Canfield silt loam, 0 to 2 percent slopes	66	IIw-4	10	1o1
CdB	Canfield silt loam, 2 to 6 percent slopes	66	IIe-3	10	1o1
CdC	Canfield silt loam, 6 to 12 percent slopes	67	IIIe-3	11	1o1
CdC2	Canfield silt loam, 6 to 12 percent slopes, moderately eroded	67	IIIe-3	11	1o1
CeB	Canfield silt loam, sandstone substratum, 2 to 6 percent slopes	67	IIe-3	10	1o1
CfB	Canfield-Urban land complex, undulating	67	------	--	1o1
CfC	Canfield-Urban land complex, rolling	67	------	--	1o1
Cg	Carlisle muck	68	IIIw-5	13	4
Ch	Chagrin silt loam	68	IIw-5	11	1o1
Ck	Chagrin silt loam, alkaline	69	IIw-5	11	1o1
Cm	Chagrin-Urban land complex	69	------	--	1o1
CnA	Chili loam, 0 to 2 percent slopes	70	IIs-1	11	2o1
CnB	Chili loam, 2 to 6 percent slopes	70	IIe-1	9	2o1
CnC	Chili loam, 6 to 12 percent slopes	70	IIIe-1	11	2o1
CoC2	Chili gravelly loam, 6 to 12 percent slopes, moderately eroded	70	IIIe-1	11	2o1
CoD2	Chili gravelly loam, 12 to 18 percent slopes, moderately eroded	71	IVe-1	13	2r1
CpA	Chili silt loam, 0 to 2 percent slopes	71	IIs-1	11	2o1
CpB	Chili silt loam, 2 to 6 percent slopes	71	IIe-2	9	2o1
CpC	Chili silt loam, 6 to 12 percent slopes	71	IIIe-1	11	2o1
CuB	Chili-Urban land complex, undulating	71	------	--	2o1
CuC	Chili-Urban land complex, rolling	71	------	--	2o1
CwC2	Chili-Wooster complex, 6 to 12 percent slopes, moderately eroded	71	IIIe-1	11	2o1
CwD2	Chili-Wooster complex, 12 to 18 percent slopes, moderately eroded	72	IVe-1	13	2r1
CwE2	Chili-Wooster complex, 18 to 25 percent slopes, moderately eroded	72	VIe-1	14	2r1
Cx	Clay pits and quarries	72	------	--	4

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group
			Symbol	Page	Symbol
CyD	Conotton-Oshtemo complex, 12 to 18 percent slopes	73	VIe-1	14	3f1
CyE	Conotton-Oshtemo complex, 18 to 25 percent slopes	73	VIe-1	14	3f1
CyF	Conotton-Oshtemo complex, 25 to 50 percent slopes	73	VIIe-1	14	3f1
Da	Damascus loam	74	IIIw-2	12	2w1
DkC	Dekalb sandy loam, 6 to 12 percent slopes	74	IIIe-1	11	3o1
DkD	Dekalb sandy loam, 12 to 18 percent slopes	74	IVe-1	13	2r1
DkE	Dekalb sandy loam, 18 to 25 percent slopes	75	VIe-1	14	2r1
DkF	Dekalb sandy loam, 25 to 70 percent slopes	75	VIIe-1	14	2r1
ElB	Ellsworth silt loam, 2 to 6 percent slopes	75	IIIe-4	12	3o1
ElC	Ellsworth silt loam, 6 to 12 percent slopes	76	IVe-3	14	3o1
ElC2	Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded	76	IVe-3	14	3o1
ElE2	Ellsworth silt loam, 12 to 25 percent slopes, moderately eroded	76	VIe-2	14	3r1
ElF2	Ellsworth silt loam, 25 to 50 percent slopes, moderately eroded	77	VIIe-1	14	3r1
EsB	Ellsworth silt loam, sandstone substratum, 2 to 6 percent slopes	77	IIIe-4	12	3o1
EsC	Ellsworth silt loam, sandstone substratum, 6 to 12 percent slopes	77	IVe-3	14	3o1
EuB	Ellsworth-Urban land complex, undulating	77	------	--	3o1
EuC	Ellsworth-Urban land complex, rolling	77	------	--	3o1
FcA	Fitchville silt loam, 0 to 2 percent slopes	78	IIw-2	10	2w2
FcB	Fitchville silt loam, 2 to 6 percent slopes	78	IIw-2	10	2w2
Fn	Fitchville-Urban land complex	78	------	--	2w2
Fr	Frenchtown silt loam	79	IIIw-2	12	2w1
GbB	Geeburg silt loam, 2 to 6 percent slopes	80	IIIe-4	12	2c1
GbC2	Geeburg silt loam, 6 to 12 percent slopes, moderately eroded	80	IVe-3	14	2c1
GbD2	Geeburg silt loam, 12 to 18 percent slopes, moderately eroded	80	VIe-2	14	2c1
GfA	Glenford silt loam, 0 to 2 percent slopes	81	I-1	9	1o1
GfB	Glenford silt loam, 2 to 6 percent slopes	81	IIe-2	9	1o1
GfC2	Glenford silt loam, 6 to 12 percent slopes, moderately eroded	81	IIIe-2	11	1o1
GfD2	Glenford silt loam, 12 to 18 percent slopes, moderately eroded	81	IVe-1	13	1r1
GoB	Glenford-Urban land complex, undulating	81	------	--	1o1
GoC	Glenford-Urban land complex, rolling	82	------	--	1o1
Gp	Gravel pits	82	------	--	4
HcB	Haskins-Caneadea complex, 2 to 6 percent slopes	83	IIw-2	10	3w1
Ho	Holly silt loam	83	IIIw-1	12	2w1

Map symbol	Mapping unit	Described on page	Capability unit Symbol	Capability unit Page	Woodland suitability group Symbol
Hy	Holly silt loam, alkaline	83	IIIw-1	12	2w1
JtA	Jimtown loam, 0 to 2 percent slopes	84	IIw-2	10	2w2
JtB	Jimtown loam, 2 to 6 percent slopes	84	IIw-2	10	2w2
Ju	Jimtown-Urban land complex	84	------	--	2w2
Ld	Linwood muck	85	IIIw-5	13	4
Le	Lobdell silt loam	85	IIw-5	11	1o1
Ln	Lorain silty clay loam	86	IIIw-6	13	2w1
LoB	Loudonville silt loam, 2 to 6 percent slopes	87	IIe-2	9	2o1
LoC	Loudonville silt loam, 6 to 12 percent slopes	87	IIIe-2	11	2o1
LoC2	Loudonville silt loam, 6 to 12 percent slopes, moderately eroded	87	IIIe-2	11	2o1
LoD	Loudonville silt loam, 12 to 18 percent slopes	87	IVe-1	13	2r1
LoE	Loudonville silt loam, 18 to 25 percent slopes	87	VIe-1	14	2r1
LuC	Loudonville-Urban land complex, rolling	87	------	--	2o1
Ly	Luray silt loam	88	IIw-3	10	2w1
Ma	Made land, chemical waste	88	------	--	4
Md	Made land, sanitary fill	88	------	--	4
MgA	Mahoning silt loam, 0 to 2 percent slopes	89	IIIw-3	12	2w2
MgB	Mahoning silt loam, 2 to 6 percent slopes	89	IIIw-3	12	2w2
MlB	Mahoning silt loam, sandstone substratum, 2 to 6 percent slopes	89	IIIw-3	12	2w2
Mn	Mahoning-Urban land complex	89	------	--	2w2
MtB	Mitiwanga silt loam, 2 to 6 percent slopes	90	IIIw-3	12	3w1
Od	Olmsted loam	91	IIw-3	10	2w1
Or	Orrville silt loam	91	IIw-1	10	2w1
OsA	Oshtemo sandy loam, 0 to 2 percent slopes	92	IIs-1	11	3s1
OsB	Oshtemo sandy loam, 2 to 6 percent slopes	92	IIe-1	9	3s1
OsC	Oshtemo sandy loam, 6 to 12 percent slopes	92	IIIe-1	11	3s1
ReA	Ravenna silt loam, 0 to 2 percent slopes	93	IIw-4	10	2w2
ReB	Ravenna silt loam, 2 to 6 percent slopes	93	IIw-4	10	2w2
Rn	Ravenna-Urban land complex	93	------	--	2w2
RsB	Rittman silt loam, 2 to 6 percent slopes	94	IIe-3	10	2w2
RsC	Rittman silt loam, 6 to 12 percent slopes	94	IIIe-3	11	2w2
RsC2	Rittman silt loam, 6 to 12 percent slopes, moderately eroded	95	IIIe-3	11	2w2
RsD	Rittman silt loam, 12 to 18 percent slopes	95	IVe-2	14	2w2
RsD2	Rittman silt loam, 12 to 18 percent slopes, moderately eroded	95	IVe-2	14	2w2
RsE2	Rittman silt loam, 18 to 25 percent slopes, moderately eroded	95	VIe-2	14	2w2
RtB	Rittman silt loam, sandstone substratum, 2 to 6 percent slopes	95	IIe-3	10	2w2
RtC	Rittman silt loam, sandstone substratum, 6 to 12 percent slopes	95	IIIe-3	11	2w2
RuB	Rittman-Urban land complex, undulating	95	------	--	2w2
RuC	Rittman-Urban land complex, rolling	95	------	--	2w2
Rv	Rough broken land, clay and silt	96	VIIe-1	14	2r1
Rw	Rough broken land, silt and sand	96	VIIe-1	14	2r1
Sb	Sebring silt loam	97	IIIw-2	12	2w1
Sc	Shale rock land	97	VIIe-1	14	4
So	Sloan silt loam	97	IIIw-1	12	2w1
Tg	Tioga loam	98	IIw-5	11	1o1
Tr	Trumbull silt loam	99	IVw-1	14	2w1
Ur	Urban land	99	------	--	4
WaA	Wadsworth silt loam, 0 to 2 percent slopes	100	IIIw-4	13	2w2
WaB	Wadsworth silt loam, 2 to 6 percent slopes	100	IIIw-4	13	2w2
Wb	Wadsworth-Urban land complex	100	------	--	2w2
Wc	Wallkill silt loam	100	IIIw-1	12	2w1
WrA	Wheeling silt loam, 0 to 2 percent slopes	101	I-1	9	1o1
WrB	Wheeling silt loam, 2 to 6 percent slopes	101	IIe-2	9	1o1
Wt	Willette muck	102	IIIw-5	13	4
WuB	Wooster silt loam, 2 to 6 percent slopes	103	IIe-2	9	1o1
WuC	Wooster silt loam, 6 to 12 percent slopes	103	IIIe-2	11	1o1
WuC2	Wooster silt loam, 6 to 12 percent slopes, moderately eroded	103	IIIe-2	11	1o1
WuD	Wooster silt loam, 12 to 18 percent slopes	103	IVe-1	13	1r1
WuD2	Wooster silt loam, 12 to 18 percent slopes, moderately eroded	103	IVe-1	13	1r1
WuE2	Wooster silt loam, 18 to 25 percent slopes, moderately eroded	103	VIe-1	14	1r1
WuF2	Wooster silt loam, 25 to 50 percent slopes, moderately eroded	103	VIe-1	14	1r1
WvC2	Wooster silt loam, sandstone substratum, 6 to 12 percent slopes, moderately eroded	103	IIIe-2	11	1o1
WvD2	Wooster silt loam, sandstone substratum, 12 to 18 percent slopes, moderately eroded	103	IVe-1	13	1r1
WwD	Wooster-Urban land complex, hilly	104	------	--	1r1

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, E, or F, shows the slope. Most symbols without a slope letter are those of nearly level soils, but some are for land types that have a considerable range in slope. A final number, 2, in the symbol shows that the soil is moderately eroded.

SYMBOL	NAME
BeF	Berks channery silt loam, 25 to 70 percent slopes
BgA	Bogart loam, 0 to 2 percent slopes
BgB	Bogart loam, 2 to 6 percent slopes
BhB	Bogart-Haskins loams, 2 to 6 percent slopes
Bp	Borrow pits
Ca	Canadice silty clay loam
CcA	Caneadea silt loam, 0 to 2 percent slopes
CcB	Caneadea silt loam, 2 to 6 percent slopes
CdA	Canfield silt loam, 0 to 2 percent slopes
CdB	Canfield silt loam, 2 to 6 percent slopes
CdC	Canfield silt loam, 6 to 12 percent slopes
CdC2	Canfield silt loam, 6 to 12 percent slopes, moderately eroded
CeB	Canfield silt loam, sandstone substratum, 2 to 6 percent slopes
CfB	Canfield-Urban land complex, undulating
CfC	Canfield-Urban land complex, rolling
Cg	Carlisle muck
Ch	Chagrin silt loam
Ck	Chagrin silt loam, alkaline
Cm	Chagrin-Urban land complex
CnA	Chili loam, 0 to 2 percent slopes
CnB	Chili loam, 2 to 6 percent slopes
CnC	Chili loam, 6 to 12 percent slopes
CoC2	Chili gravelly loam, 6 to 12 percent slopes, moderately eroded
CoD2	Chili gravelly loam, 12 to 18 percent slopes, moderately eroded
CpA	Chili silt loam, 0 to 2 percent slopes
CpB	Chili silt loam, 2 to 6 percent slopes
CpC	Chili silt loam, 6 to 12 percent slopes
CuB	Chili-Urban land complex, undulating
CuC	Chili-Urban land complex, rolling
CwC2	Chili-Wooster complex, 6 to 12 percent slopes, moderately eroded
CwD2	Chili-Wooster complex, 12 to 18 percent slopes, moderately eroded
CwE2	Chili-Wooster complex, 18 to 25 percent slopes, moderately eroded
Cx	Clay pits and quarries
CyD	Conotton-Oshtemo complex, 12 to 18 percent slopes
CyE	Conotton-Oshtemo complex, 18 to 25 percent slopes
CyF	Conotton-Oshtemo complex, 25 to 50 percent slopes
Da	Damascus loam
DkC	Dekalb sandy loam, 6 to 12 percent slopes
DkD	Dekalb sandy loam, 12 to 18 percent slopes
DkE	Dekalb sandy loam, 18 to 25 percent slopes
DkF	Dekalb sandy loam, 25 to 70 percent slopes
ElB	Ellsworth silt loam, 2 to 6 percent slopes
ElC	Ellsworth silt loam, 6 to 12 percent slopes
ElC2	Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded
ElE2	Ellsworth silt loam, 12 to 25 percent slopes, moderately eroded
ElF2	Ellsworth silt loam, 25 to 50 percent slopes, moderately eroded
EsB	Ellsworth silt loam, sandstone substratum, 2 to 6 percent slopes
EsC	Ellsworth silt loam, sandstone substratum, 6 to 12 percent slopes
EuB	Ellsworth-Urban land complex, undulating
EuC	Ellsworth-Urban land complex, rolling
FcA	Fitchville silt loam, 0 to 2 percent slopes
FcB	Fitchville silt loam, 2 to 6 percent slopes
Fn	Fitchville-Urban land complex
Fr	Frenchtown silt loam
GbB	Geeburg silt loam, 2 to 6 percent slopes
GbC2	Geeburg silt loam, 6 to 12 percent slopes, moderately eroded
GbD2	Geeburg silt loam, 12 to 18 percent slopes, moderately eroded
GfA	Glenford silt loam, 0 to 2 percent slopes
GfB	Glenford silt loam, 2 to 6 percent slopes
GfC2	Glenford silt loam, 6 to 12 percent slopes, moderately eroded
GfD2	Glenford silt loam, 12 to 18 percent slopes, moderately eroded
GoB	Glenford-Urban land complex, undulating
GoC	Glenford-Urban land complex, rolling
Gp	Gravel pits
HcB	Haskins-Caneadea complex, 2 to 6 percent slopes
Ho	Holly silt loam
Hy	Holly silt loam, alkaline
JtA	Jimtown loam, 0 to 2 percent slopes
JtB	Jimtown loam, 2 to 6 percent slopes
Ju	Jimtown-Urban land complex
Ld	Linwood muck
Le	Lobdell silt loam
Ln	Lorain silty clay loam
LoB	Loudonville silt loam, 2 to 6 percent slopes
LoC	Loudonville silt loam, 6 to 12 percent slopes
LoC2	Loudonville silt loam, 6 to 12 percent slopes, moderately eroded
LoD	Loudonville silt loam, 12 to 18 percent slopes
LoE	Loudonville silt loam, 18 to 25 percent slopes
LuC	Loudonville-Urban land complex, rolling
Ly	Luray silt loam
Ma	Made land, chemical waste
Md	Made land, sanitary fill
MgA	Mahoning silt loam, 0 to 2 percent slopes
MgB	Mahoning silt loam, 2 to 6 percent slopes
MlB	Mahoning silt loam, sandstone substratum, 2 to 6 percent slopes
Mn	Mahoning-Urban land complex
MtB	Mitiwanga silt loam, 2 to 6 percent slopes
Od	Olmsted loam
Or	Orrville silt loam
OsA	Oshtemo sandy loam, 0 to 2 percent slopes
OsB	Oshtemo sandy loam, 2 to 6 percent slopes
OsC	Oshtemo sandy loam, 6 to 12 percent slopes
ReA	Ravenna silt loam, 0 to 2 percent slopes
ReB	Ravenna silt loam, 2 to 6 percent slopes
Rn	Ravenna-Urban land complex
RsB	Rittman silt loam, 2 to 6 percent slopes
RsC	Rittman silt loam, 6 to 12 percent slopes
RsC2	Rittman silt loam, 6 to 12 percent slopes, moderately eroded
RsD	Rittman silt loam, 12 to 18 percent slopes
RsD2	Rittman silt loam, 12 to 18 percent slopes, moderately eroded
RsE2	Rittman silt loam, 18 to 25 percent slopes, moderately eroded
RtB	Rittman silt loam, sandstone substratum, 2 to 6 percent slopes
RtC	Rittman silt loam, sandstone substratum, 6 to 12 percent slopes
RuB	Rittman-Urban land complex, undulating
RuC	Rittman-Urban land complex, rolling
Rv	Rough broken land, clay and silt
Rw	Rough broken land, silt and sand
Sb	Sebring silt loam
Sc	Shale rock land
So	Sloan silt loam
Tg	Tioga loam
Tr	Trumbull silt loam
Ur	Urban land
WaA	Wadsworth silt loam, 0 to 2 percent slopes
WaB	Wadsworth silt loam, 2 to 6 percent slopes
Wb	Wadsworth-Urban land complex
Wc	Wallkill silt loam
WrA	Wheeling silt loam, 0 to 2 percent slopes
WrB	Wheeling silt loam, 2 to 6 percent slopes
Wt	Willette muck
WuB	Wooster silt loam, 2 to 6 percent slopes
WuC	Wooster silt loam, 6 to 12 percent slopes
WuC2	Wooster silt loam, 6 to 12 percent slopes, moderately eroded
WuD	Wooster silt loam, 12 to 18 percent slopes
WuD2	Wooster silt loam, 12 to 18 percent slopes, moderately eroded
WuE2	Wooster silt loam, 18 to 25 percent slopes, moderately eroded
WuF2	Wooster silt loam, 25 to 50 percent slopes, moderately eroded
WvC2	Wooster silt loam, sandstone substratum, 6 to 12 percent slopes, moderately eroded
WvD2	Wooster silt loam, sandstone substratum, 12 to 18 percent slopes, moderately eroded
WwD	Wooster-Urban land complex, hilly

SUMMIT COUNTY, OHIO NO. 1

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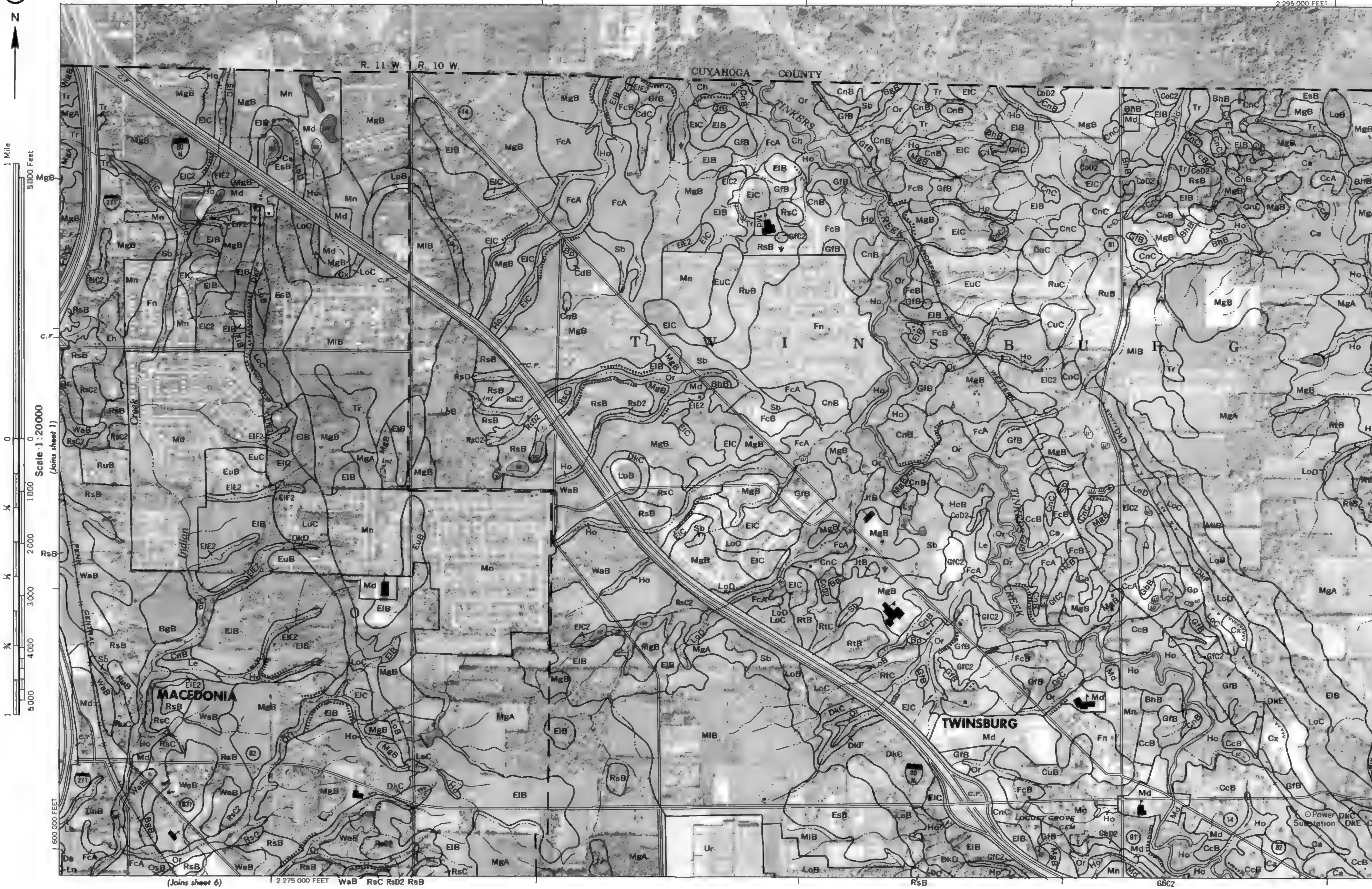
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.



Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

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SUMMIT COUNTY, OHIO NO. 2

SUMMIT COUNTY, OHIO NO. 3

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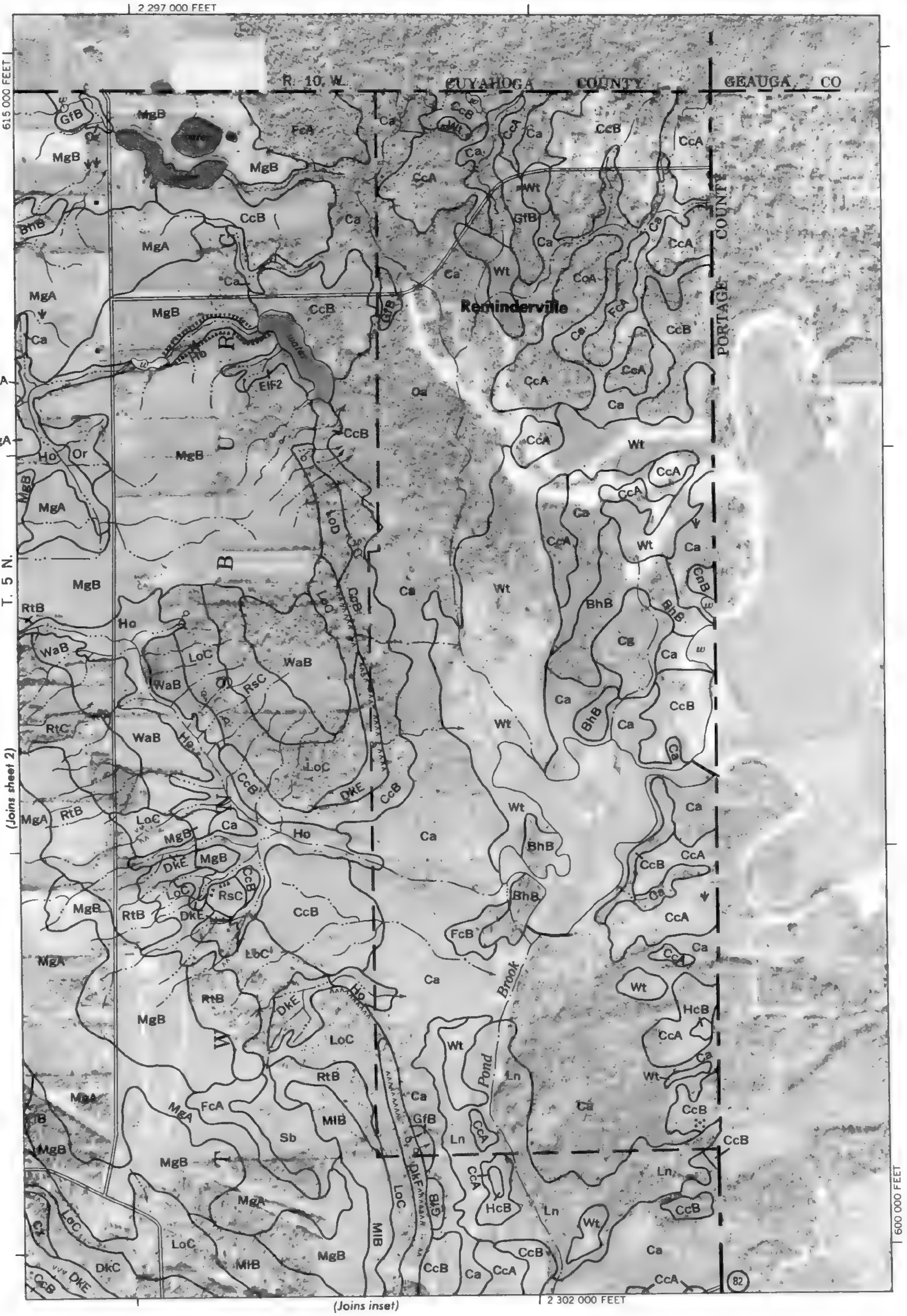
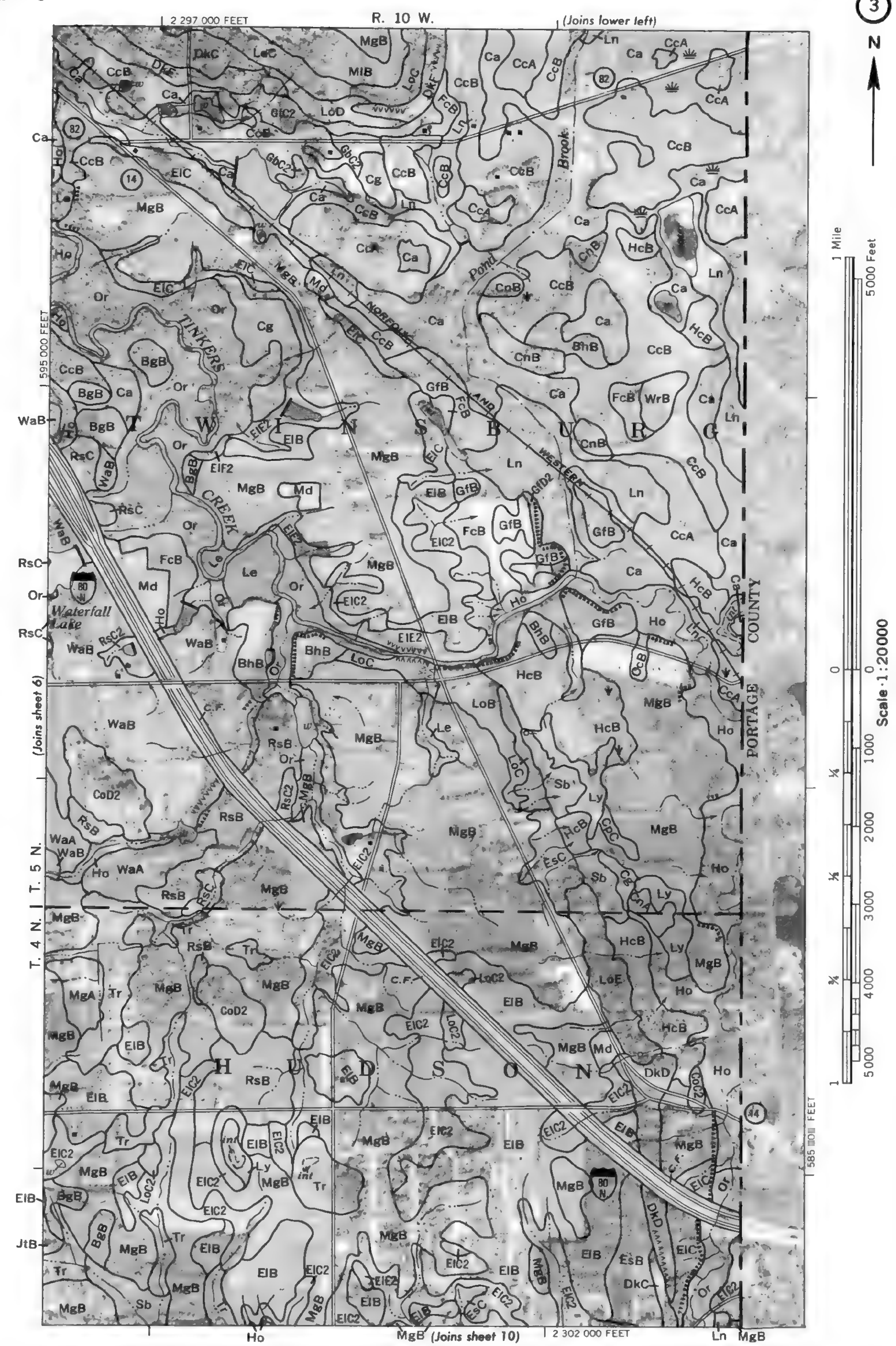
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.





SUMMIT COUNTY, OHIO — SHEET NUMBER 4

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

SUMMIT COUNTY, OHIO — SHEET NUMBER 5

SUMMIT COUNTY, OHIO NO. 5

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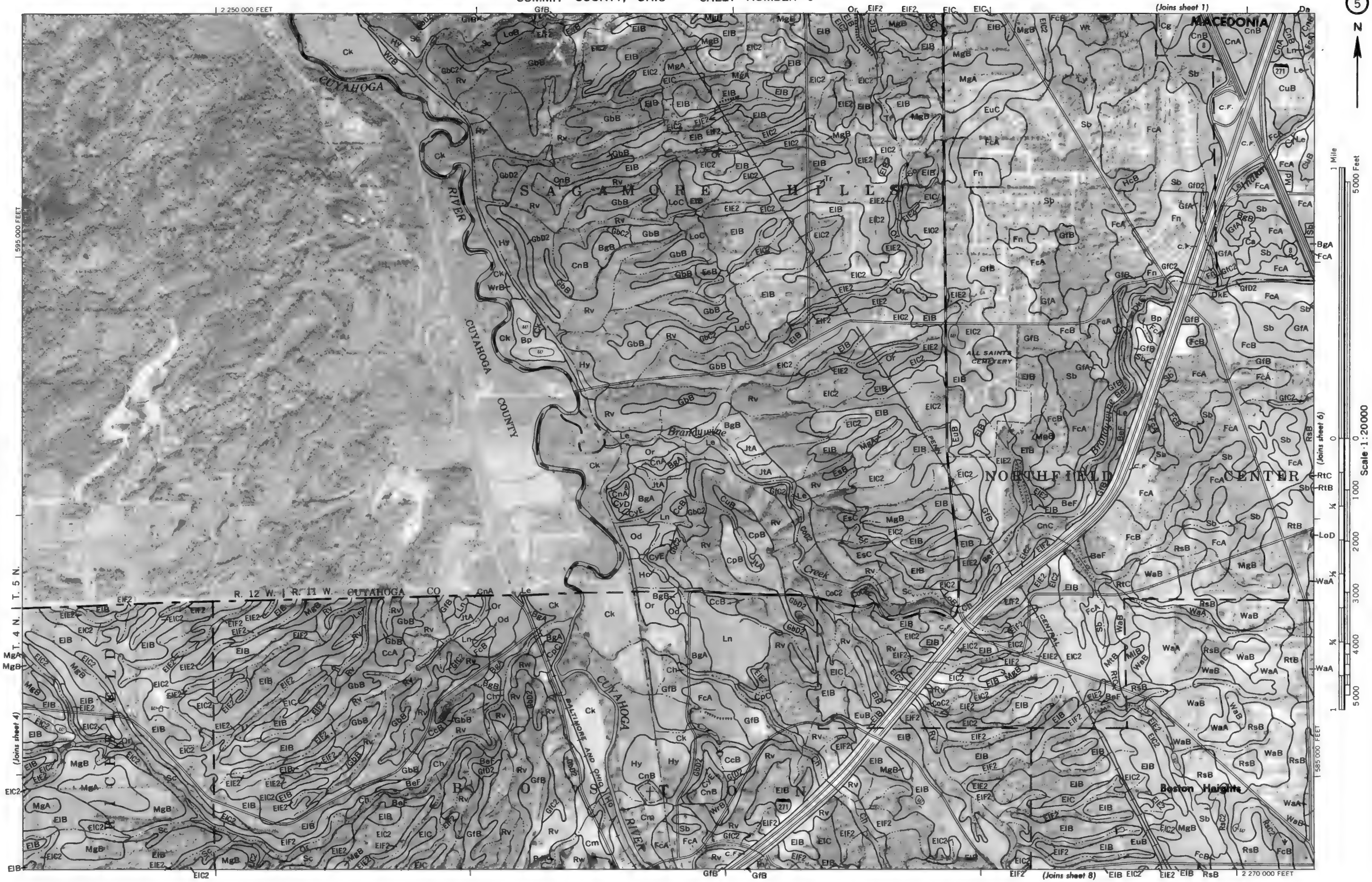
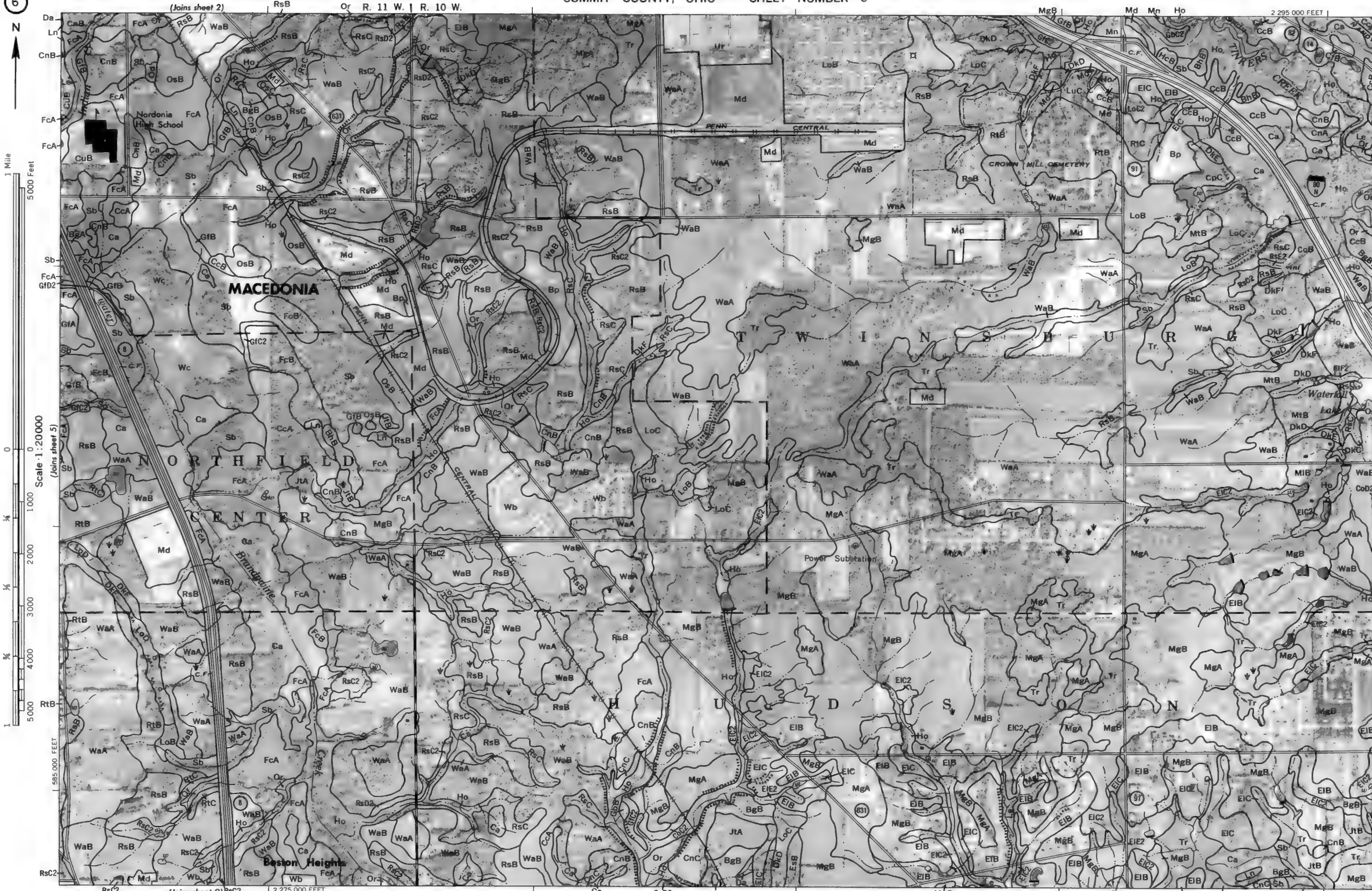
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.



SUMMIT COUNTY, OHIO — SHEET NUMBER 6



Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

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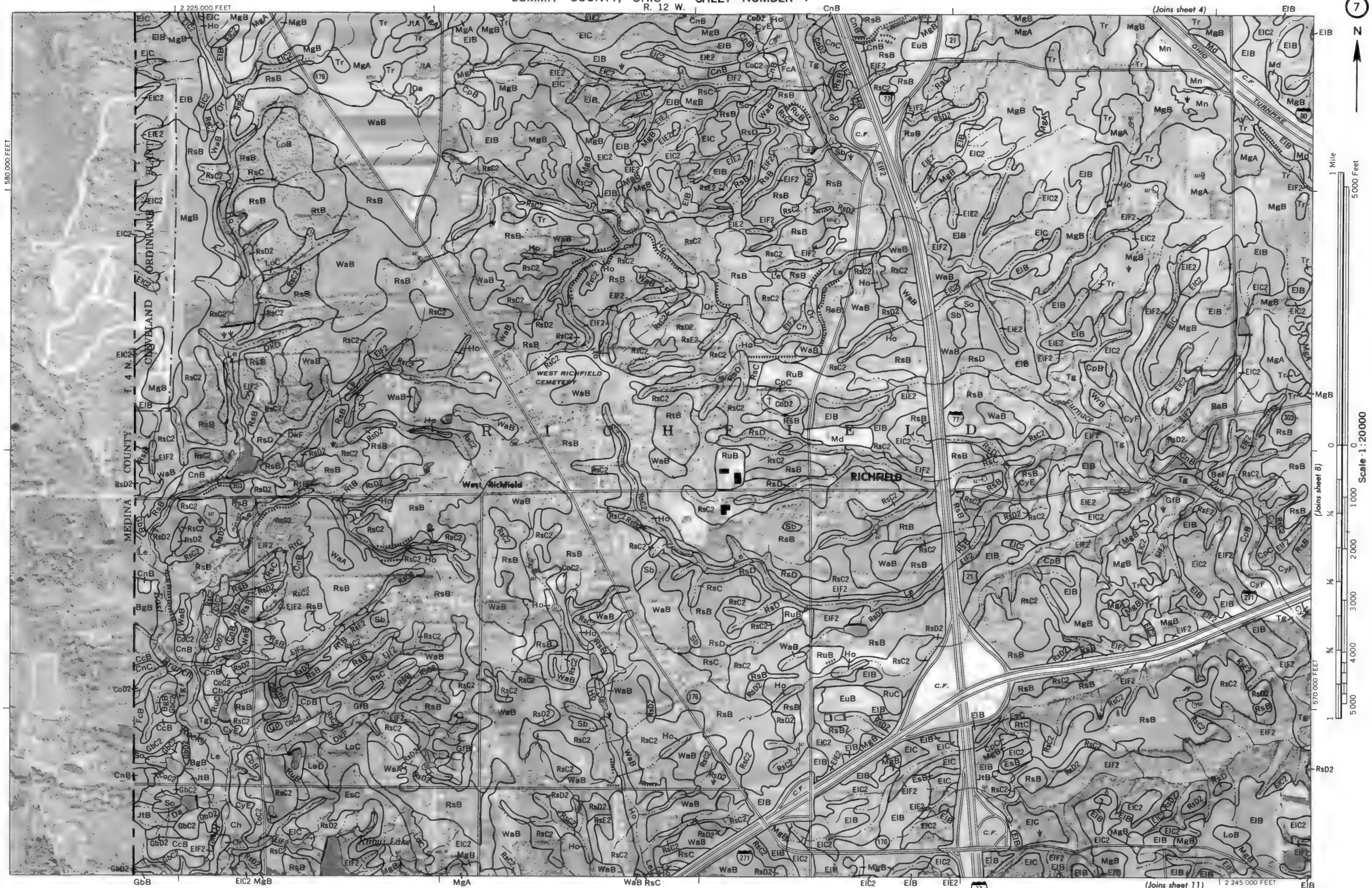
SUMMIT COUNTY, OHIO NO. 6



SUMMIT COUNTY, OHIO NO. 7

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

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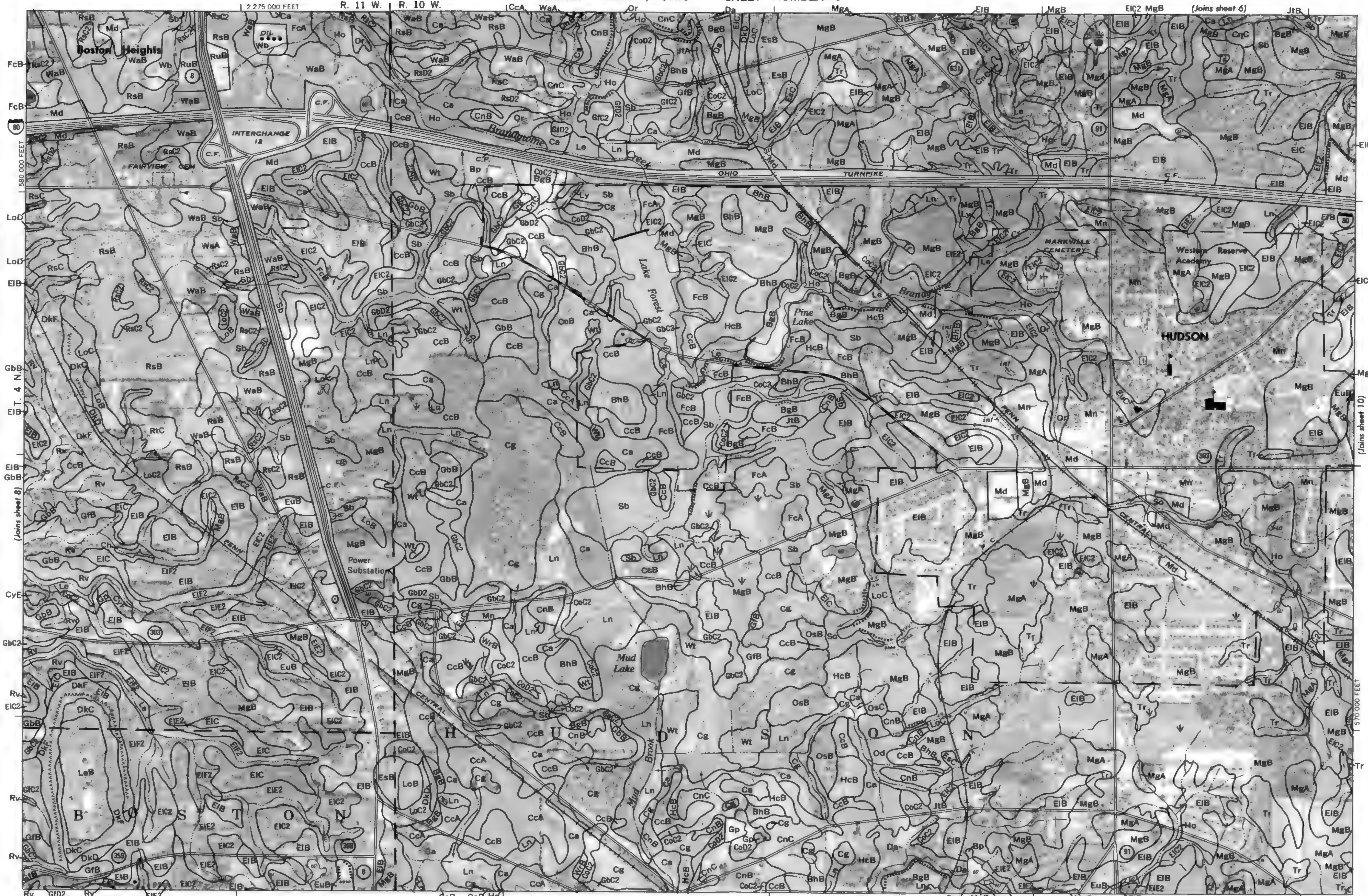
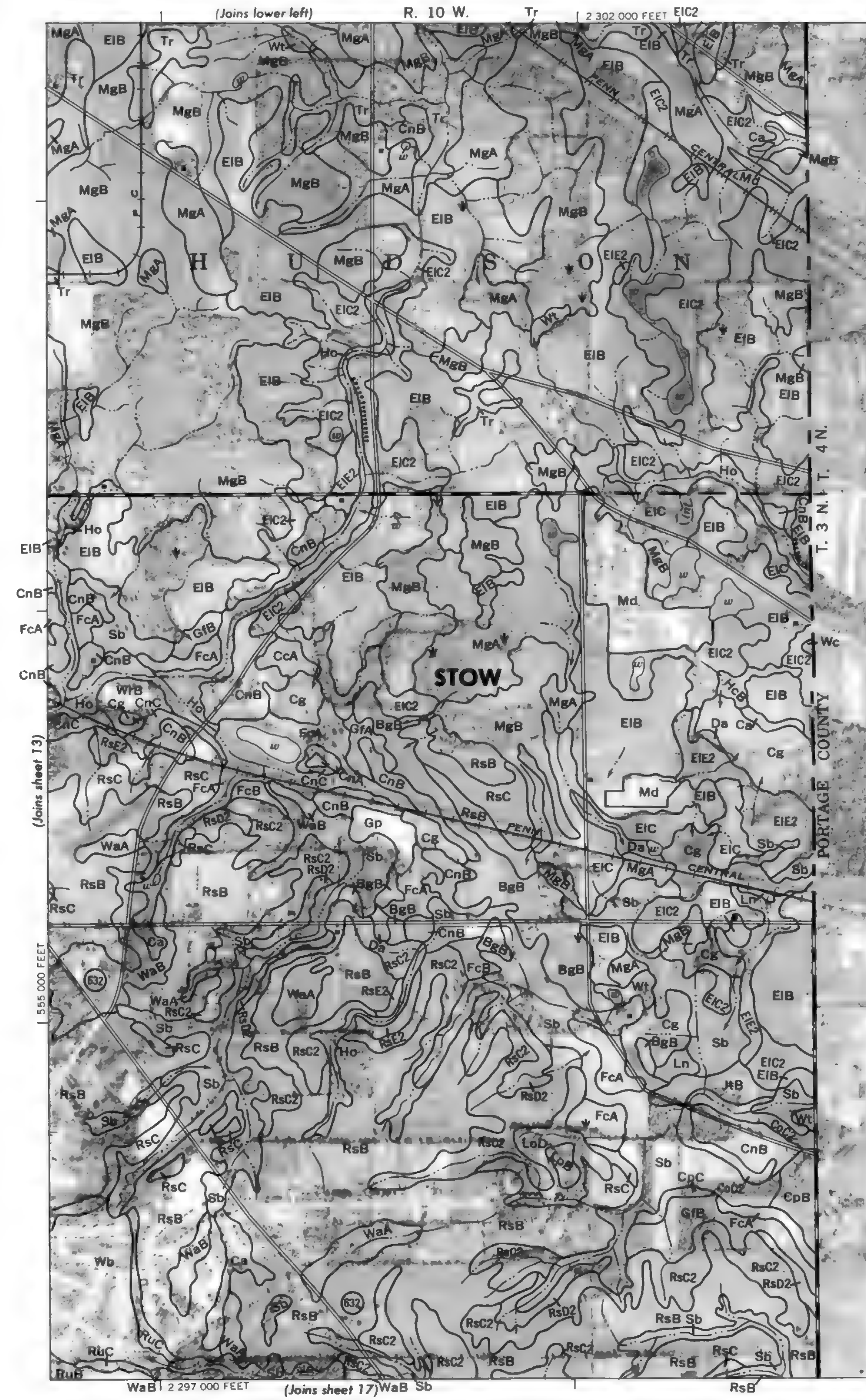
SUMMIT COUNTY, OHIO — SHEET NUMBER 9



SUMMIT COUNTY, OHIO NO. 9

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.



Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

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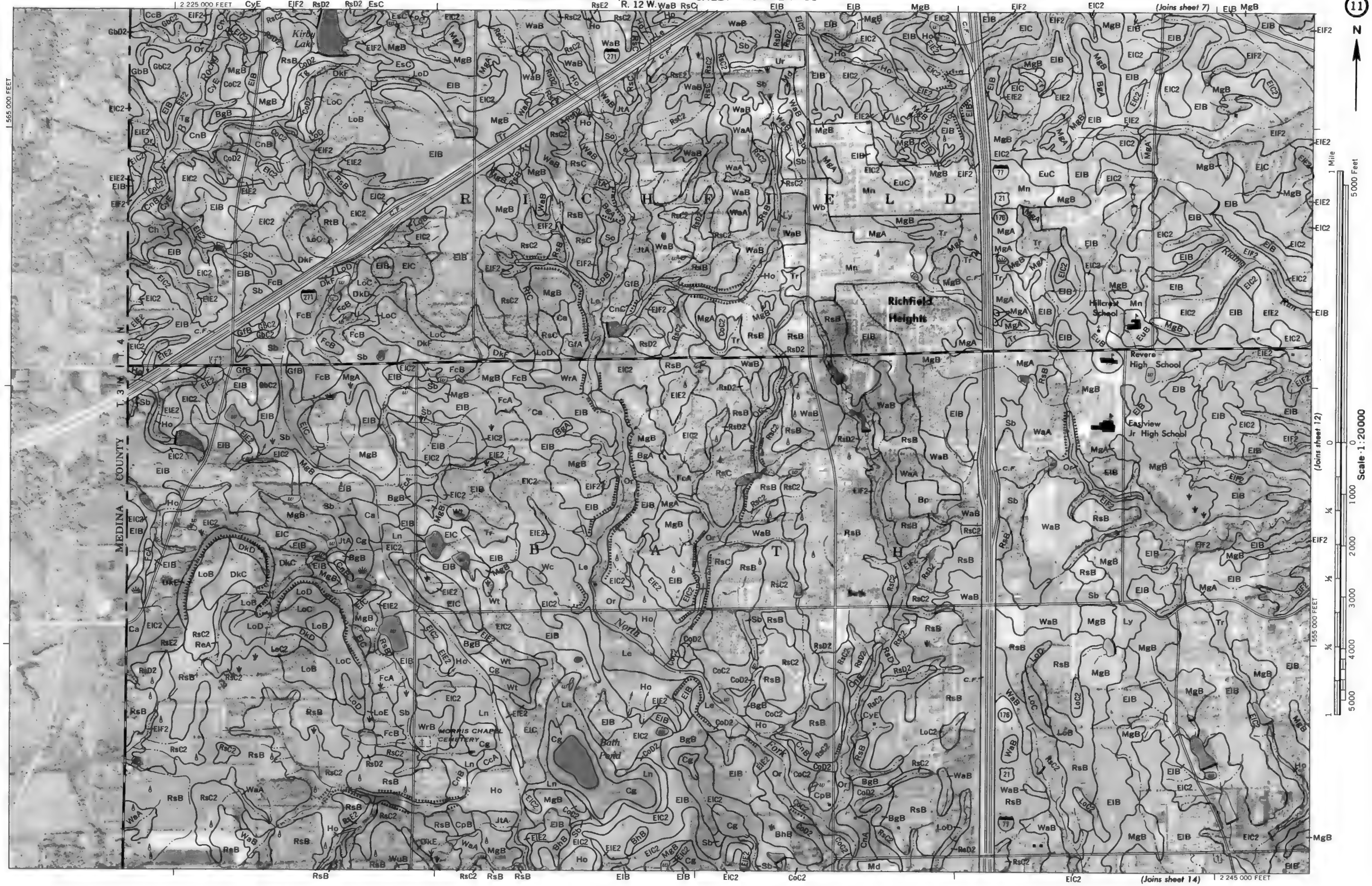
SUMMIT COUNTY, OHIO — SHEET NUMBER 11



SUMMIT COUNTY, OHIO NO. 11

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

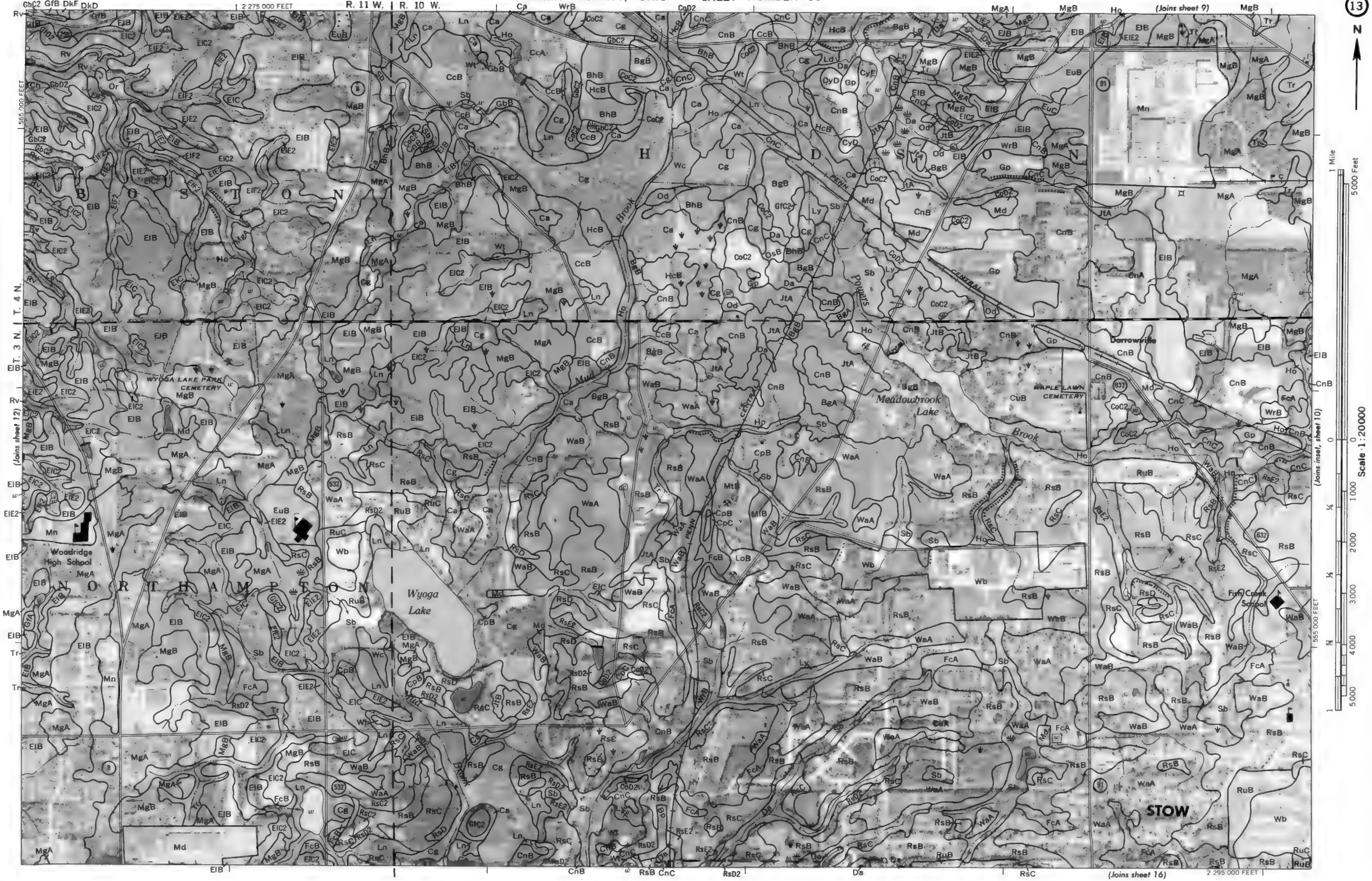
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

SUMMIT COUNTY, OHIO — SHEET NUMBER 12

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

SUMMIT COUNTY, OHIO NO. 12

SUMMIT COUNTY, OHIO — SHEET NUMBER 13

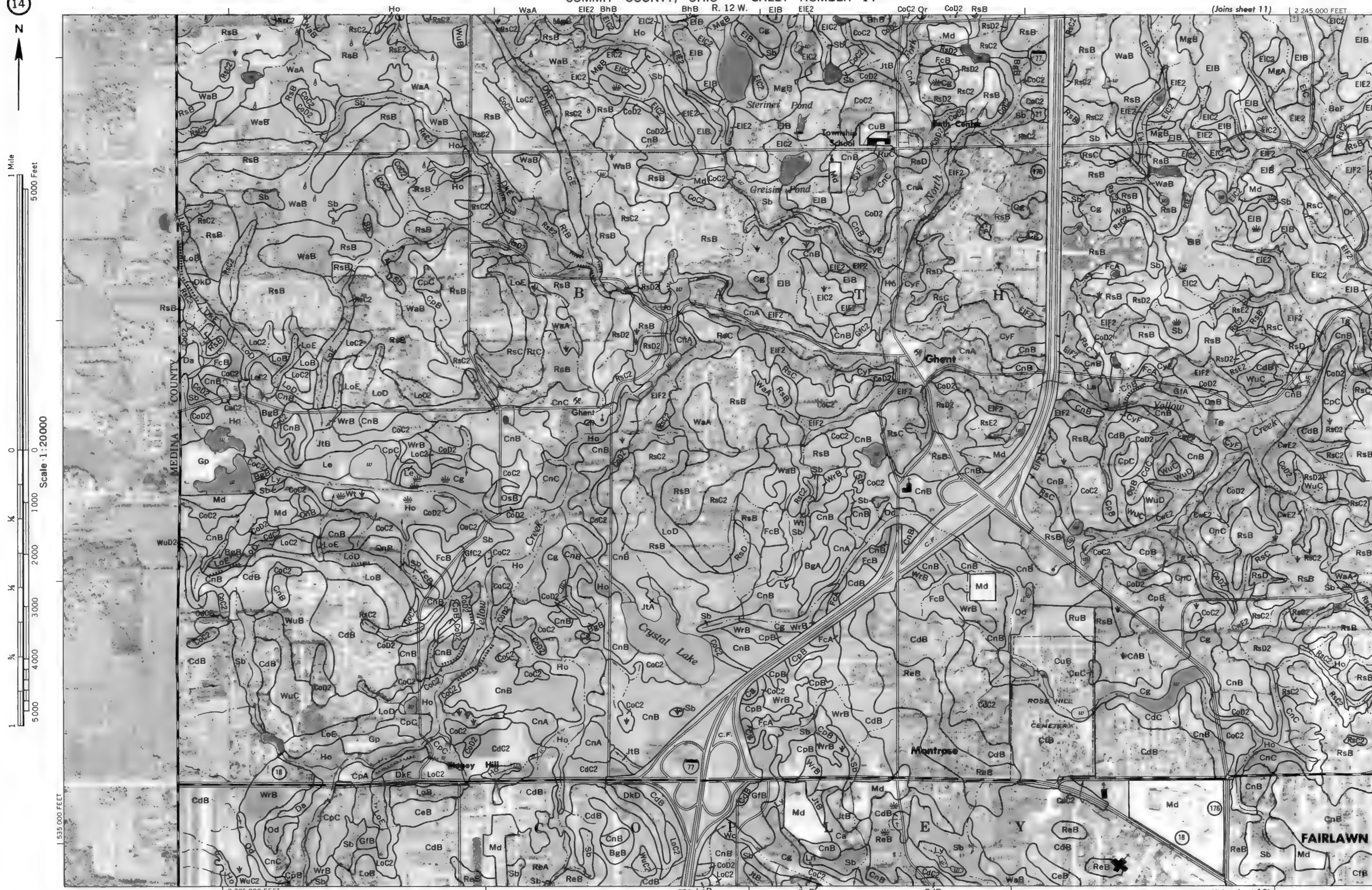


SUMMIT COUNTY, OHIO NO. 13

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

SUMMIT COUNTY, OHIO — SHEET NUMBER 14



Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.
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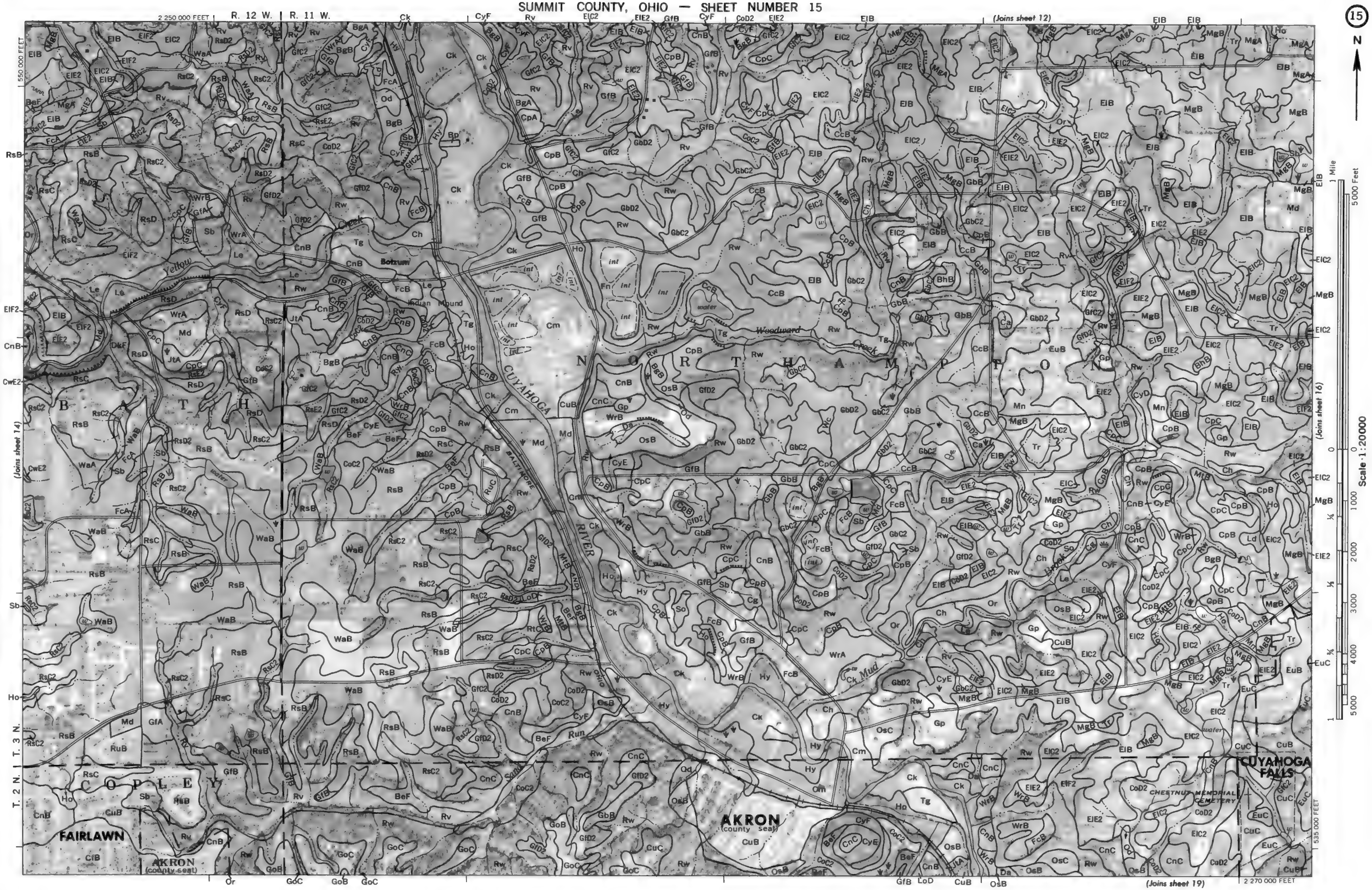
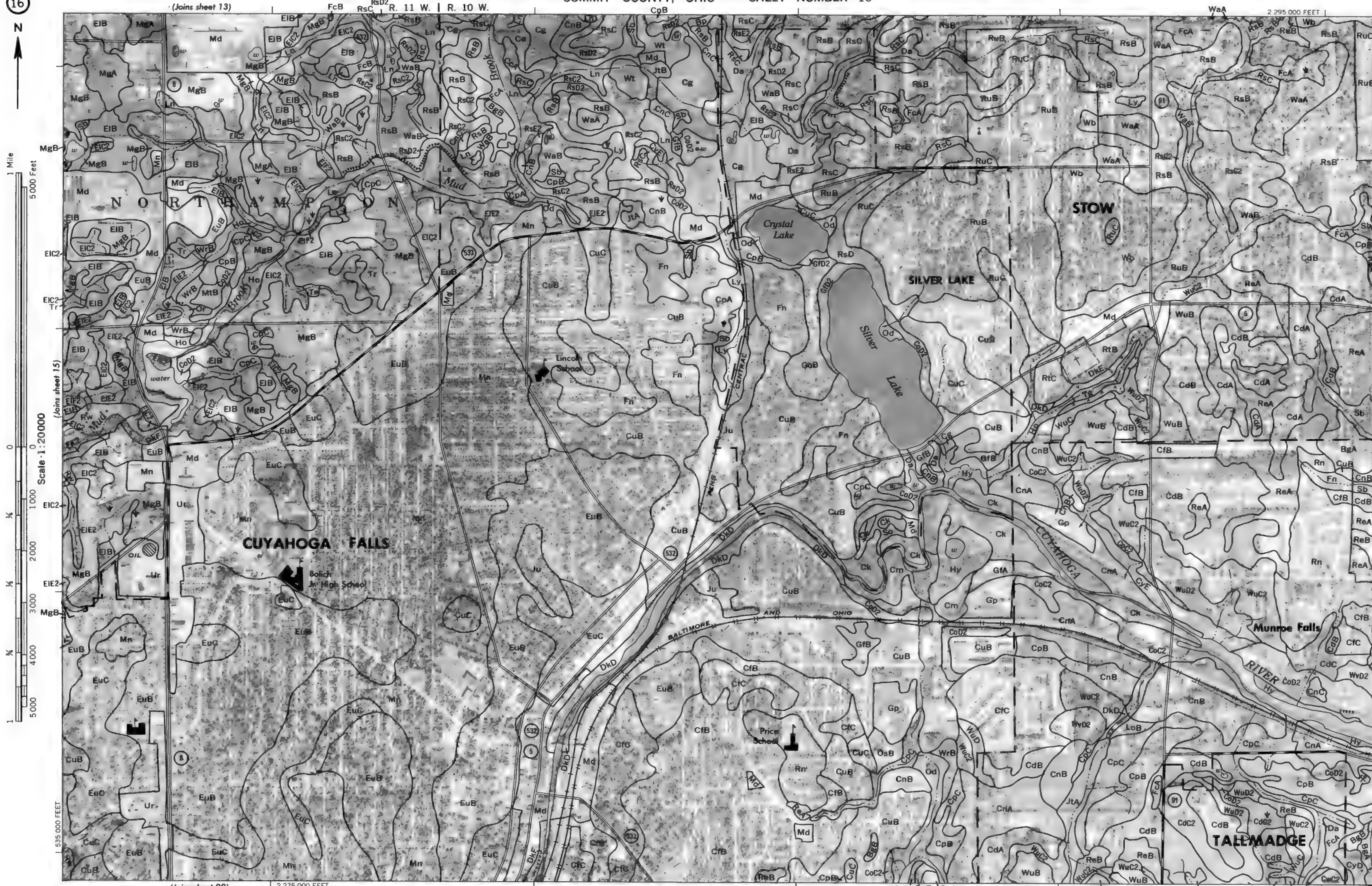
SUMMIT COUNTY, OHIO NO. 14



SUMMIT COUNTY, OHIO NO. 15

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

SUMMIT COUNTY, OHIO — SHEET NUMBER 16



Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

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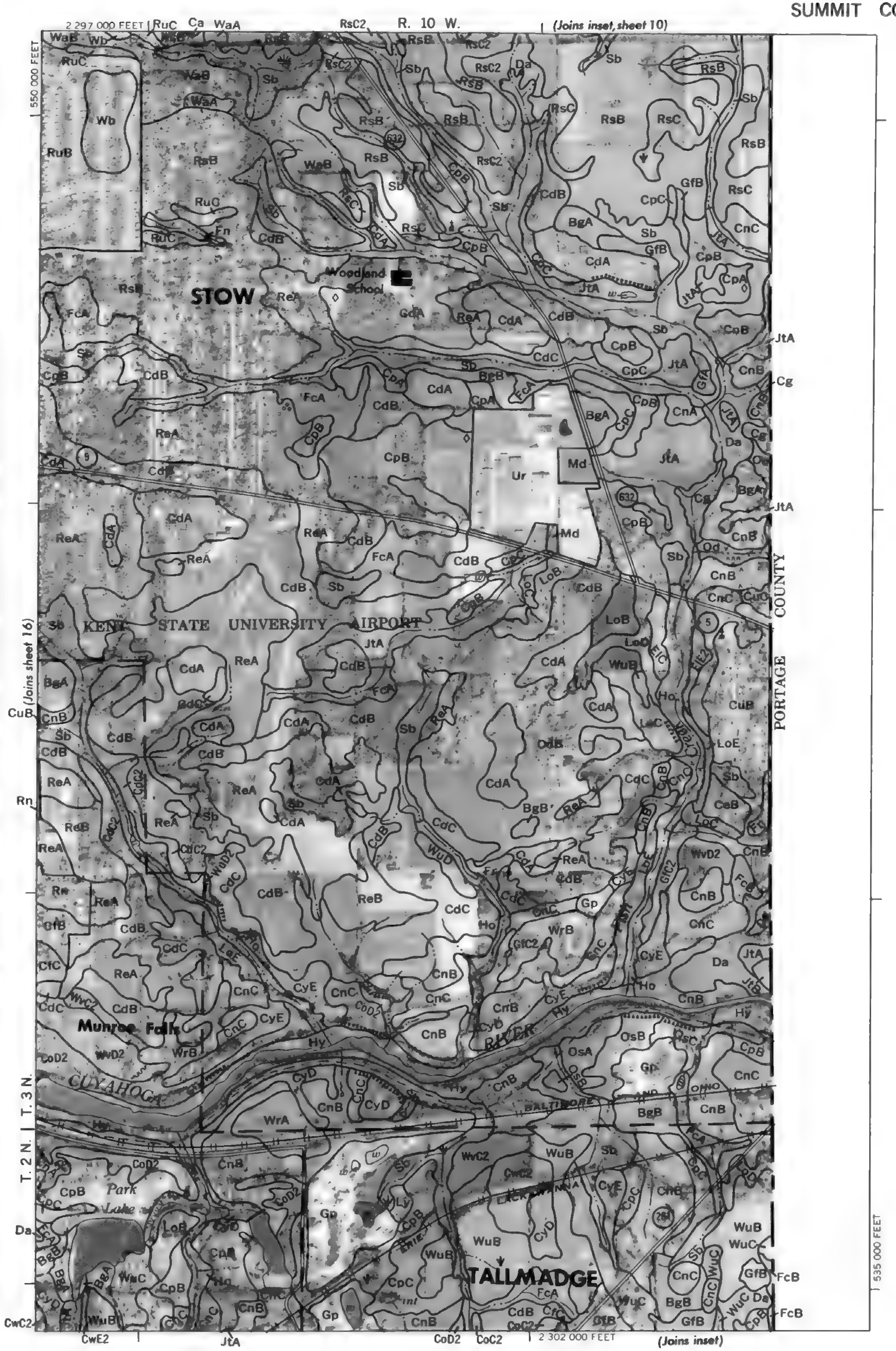
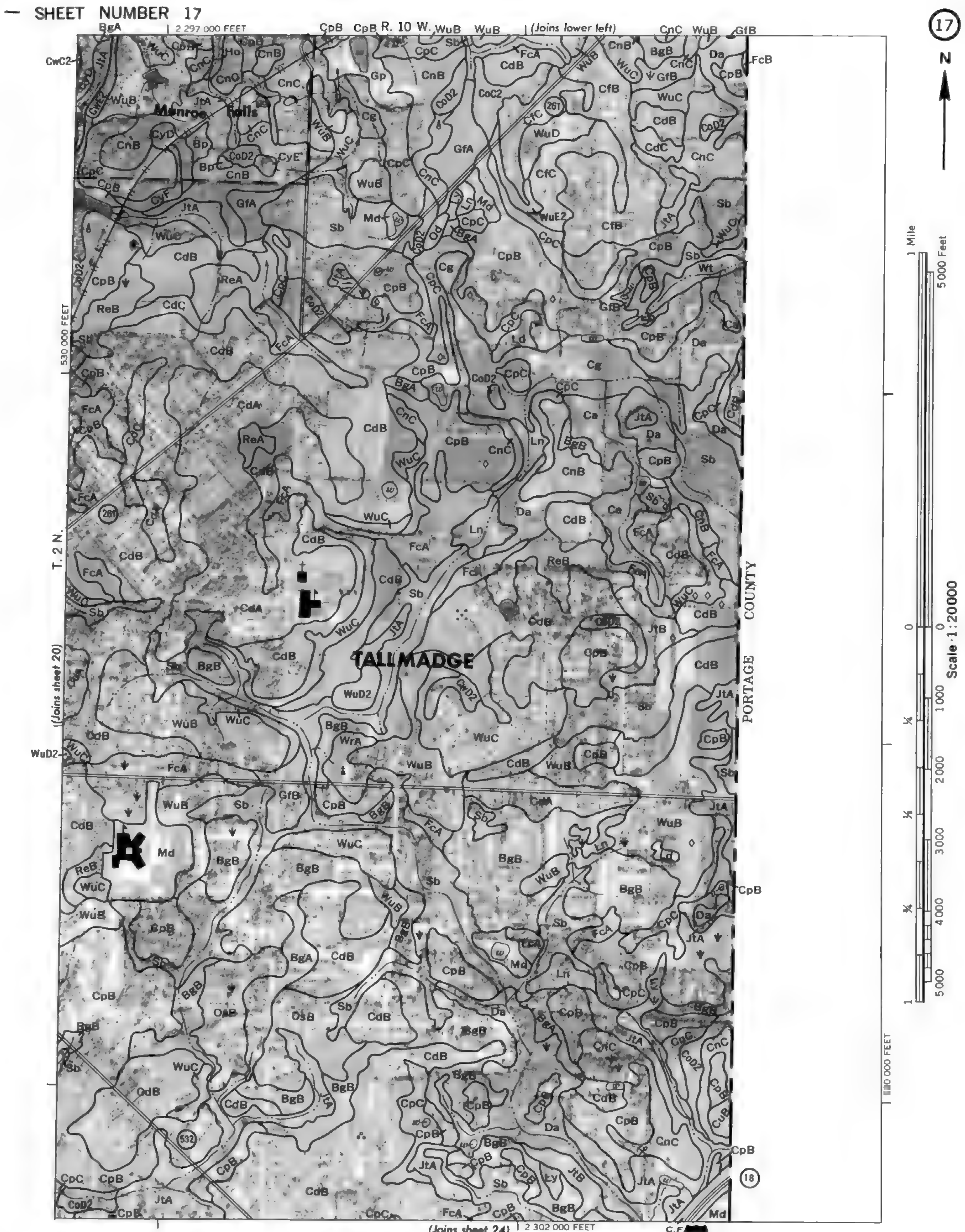
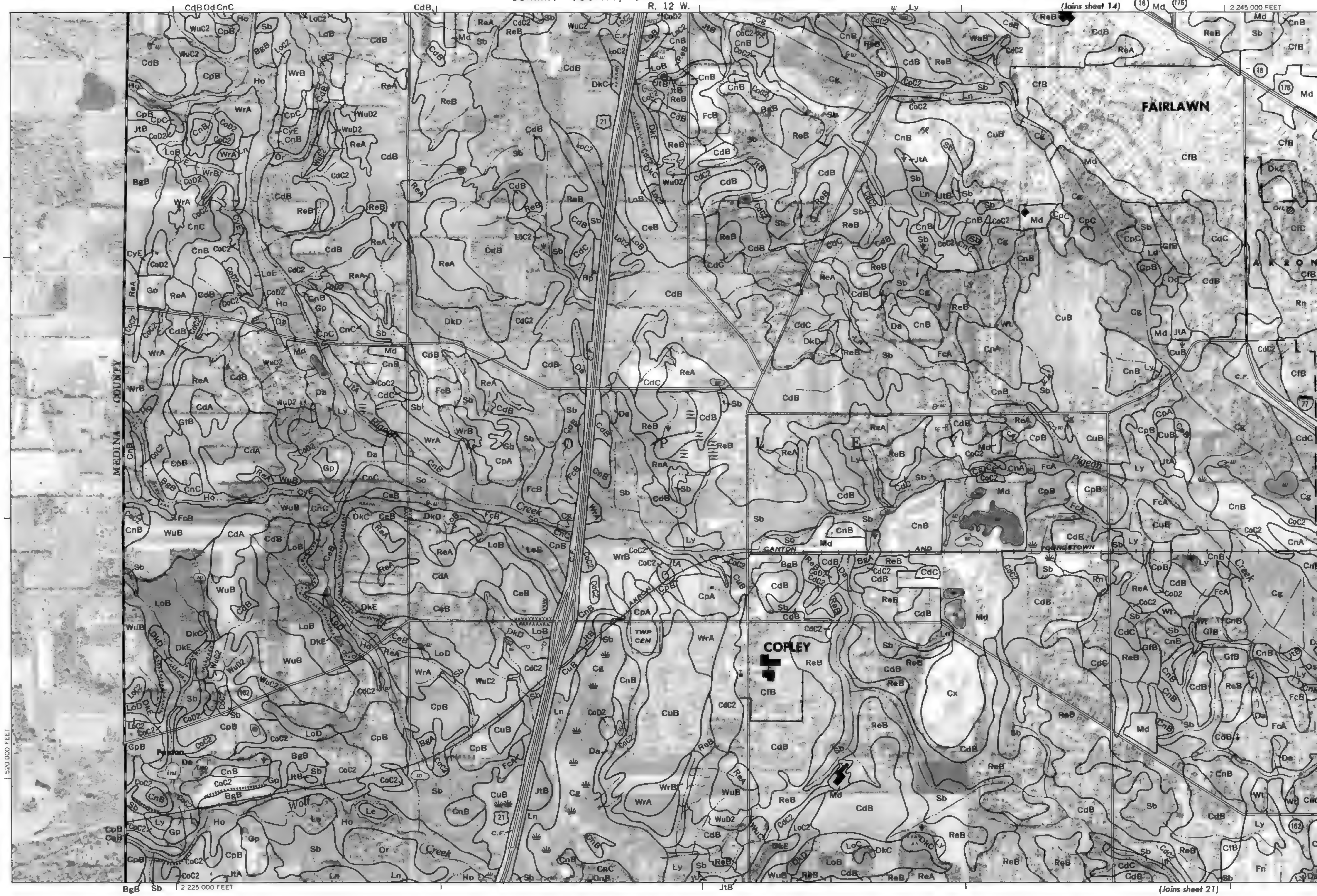
SUMMIT COUNTY, OHIO NO. 17

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.







N

Scale 1:20000

1 Mile
5000 Feet

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

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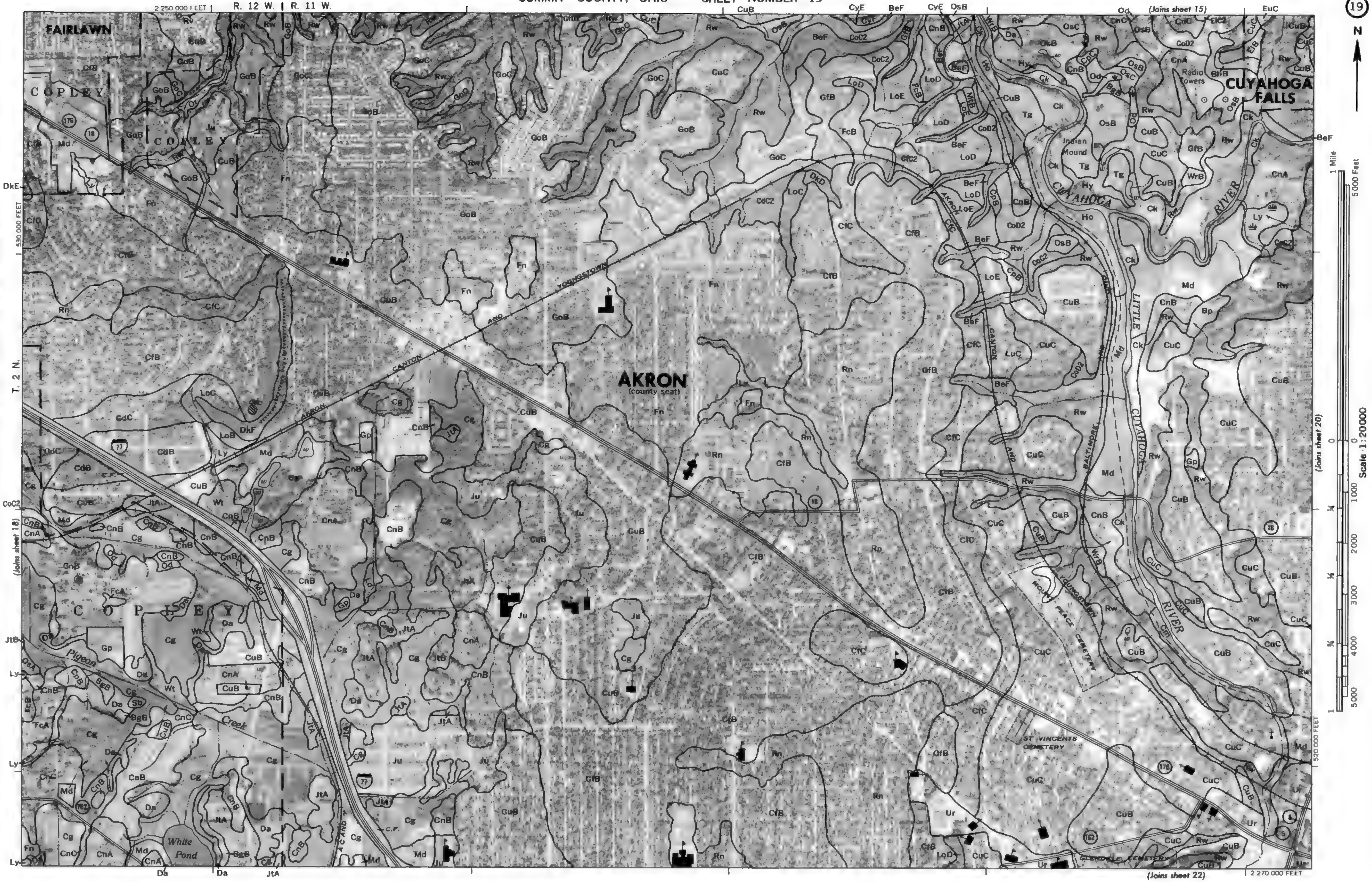


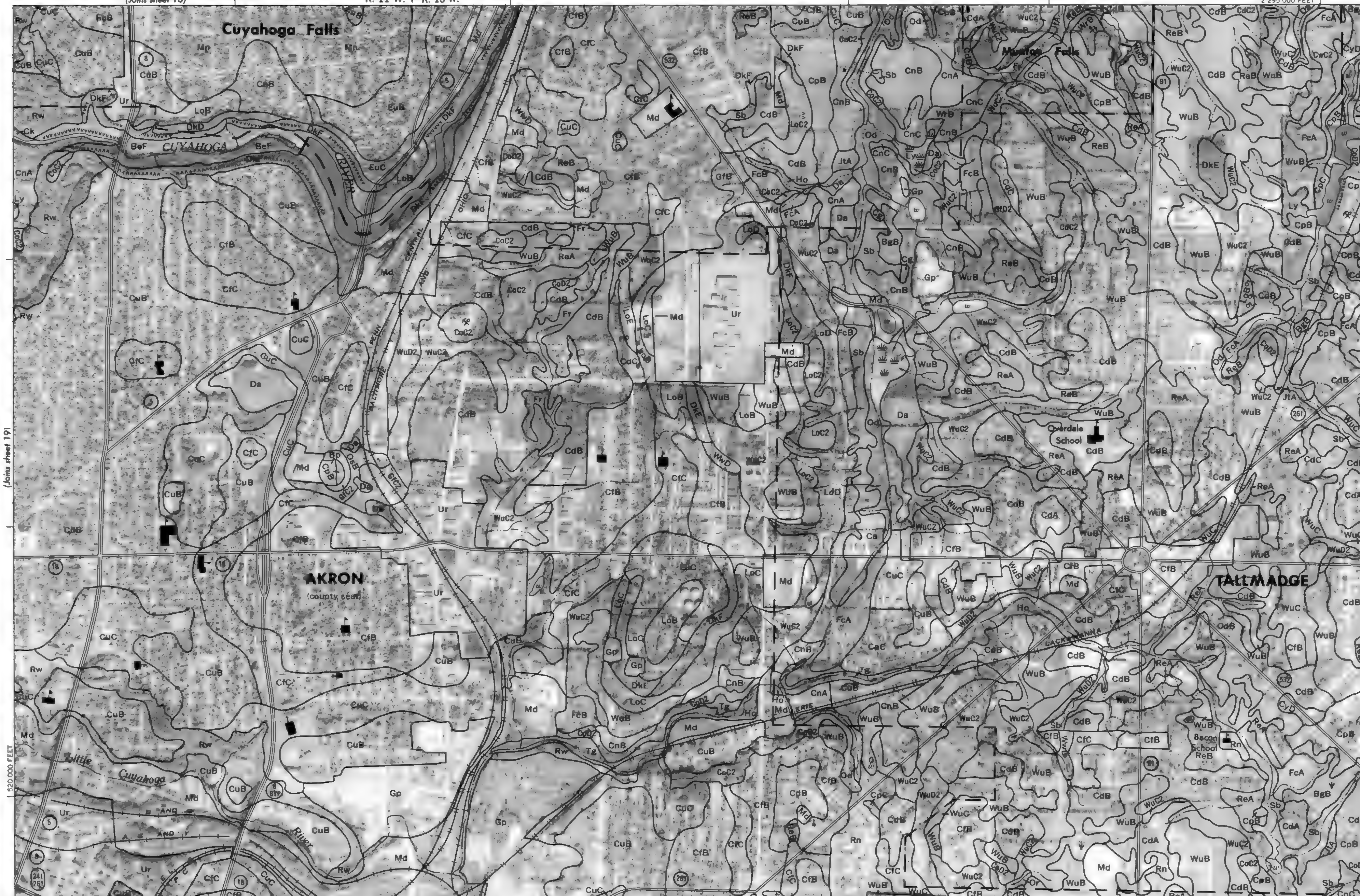
SUMMIT COUNTY, OHIO NO. 19

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

SUMMIT COUNTY, OHIO — SHEET NUMBER 20

N

(Joins sheet 16) R. 11 W. | R. 10 W. 2 295 000 FEET



1 Mile 5000 Feet
Scale 1:20000
0 1000 2000 3000 4000 5000

(Joins sheet 19)

(Joins inset, sheet 17)

(Joins sheet 23) 2 275 000 FEET

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

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(21)

(Joins sheet 18)

N

Scale 1:20000

1 Mile, ¾, ½, ¼, 0

5000 Feet, 4000, 3000, 2000, 1000, 0

SUMMIT COUNTY, OHIO NO. 21

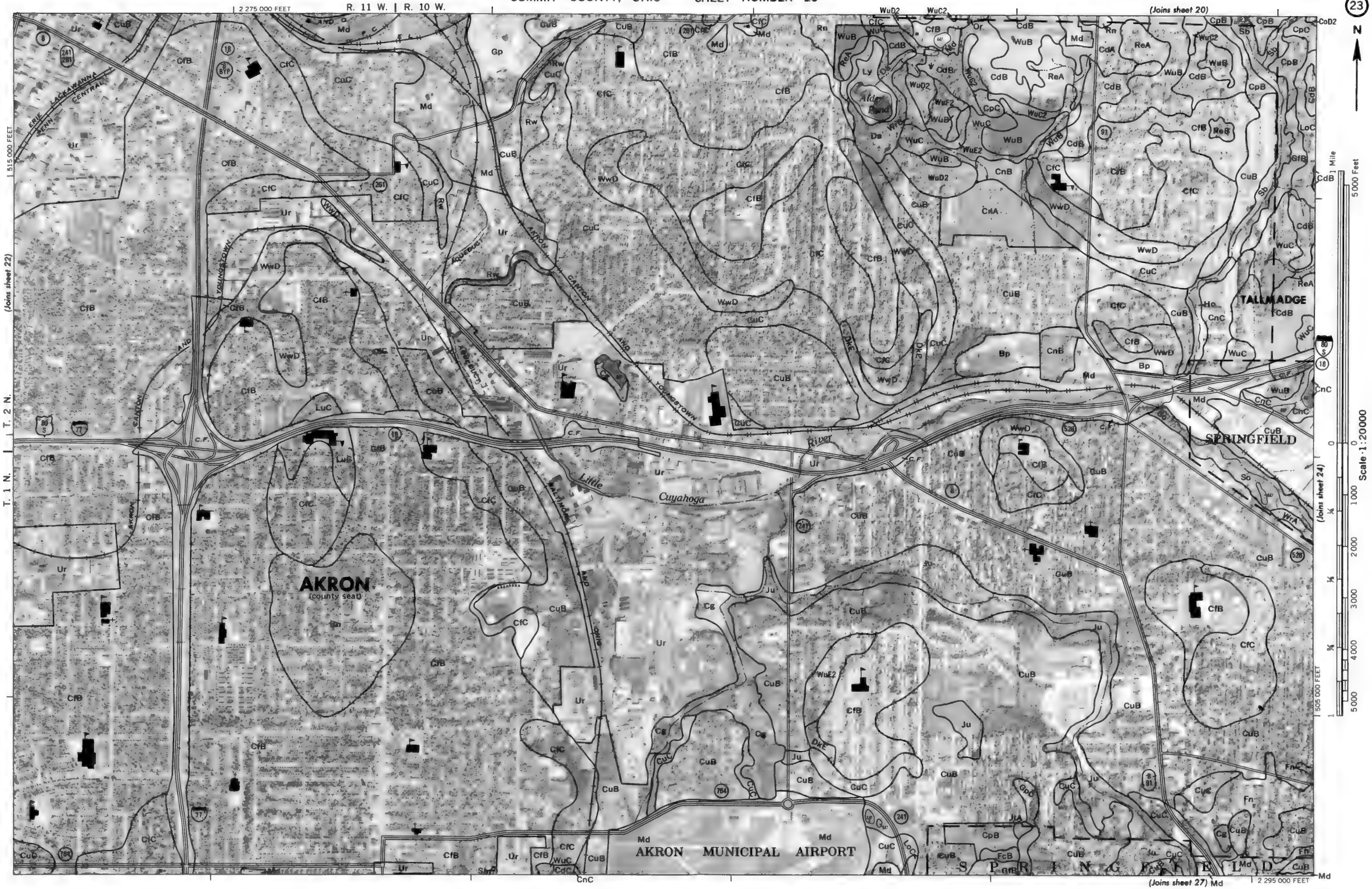
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

SUMMIT COUNTY, OHIO — SHEET NUMBER 22

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

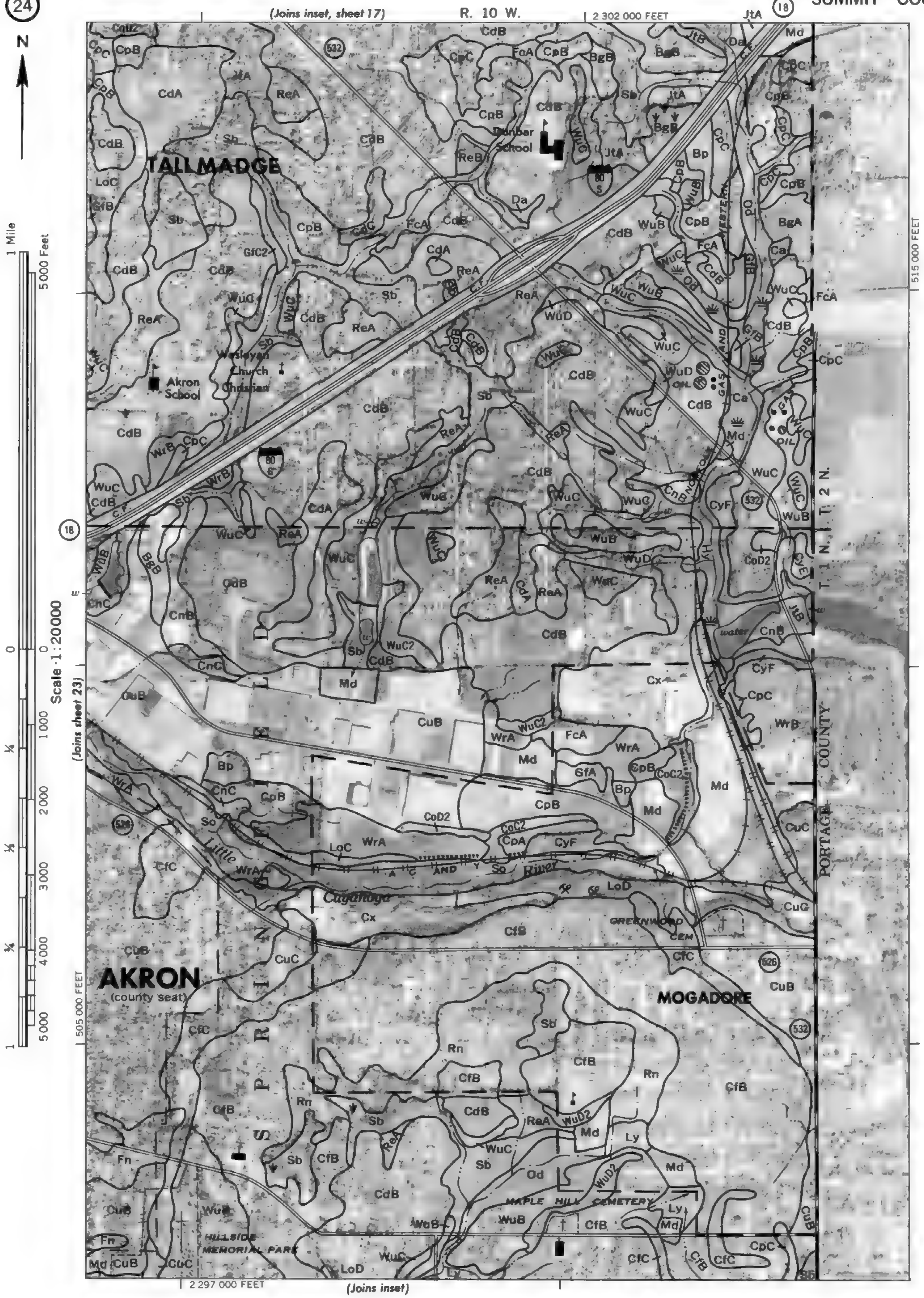
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.



SUMMIT COUNTY, OHIO NO. 23

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

SUMMIT COUNTY, OHIO — SHEET NUMBER 24



Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

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N

Scale 1:20000

1 Mile

5000 Feet

SUMMIT COUNTY, OHIO NO. 25

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

(Joins sheet 22) R. 12 W. | R. 11 W.

2 270 000 FEET

N

1 Mile

5000 Feet

Scale 1:20000

0 1000 2000 3000 4000 5000

0 ¼ ½ ¾ 1

(Joins sheet 25)

490 000 FEET

500 000 FEET

T. 1 N.

(Joins sheet 27)

(Joins sheet 29)

2 250 000 FEET

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.
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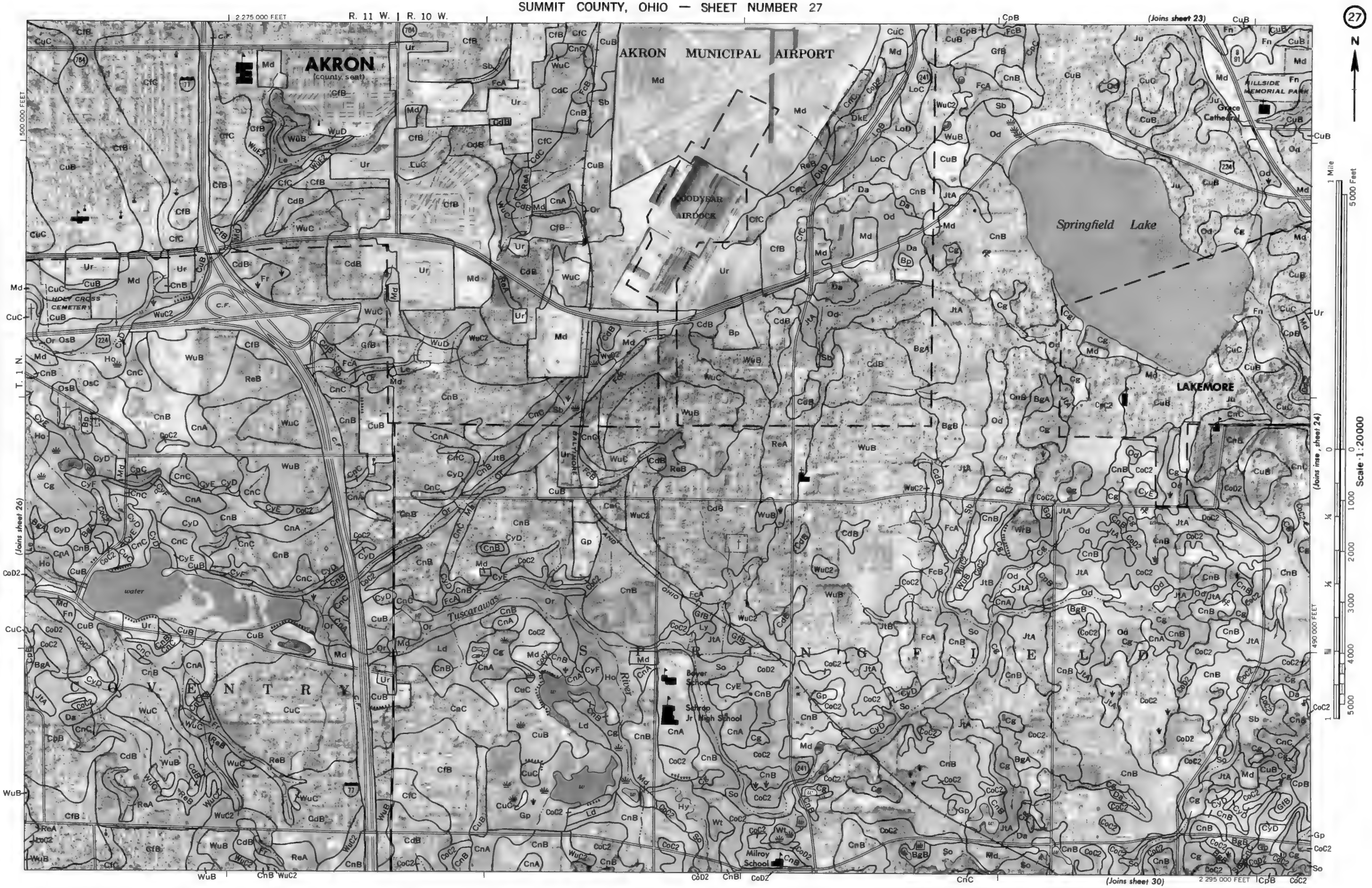


This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil; and the Ohio Agricultural Research and Development Center.
Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

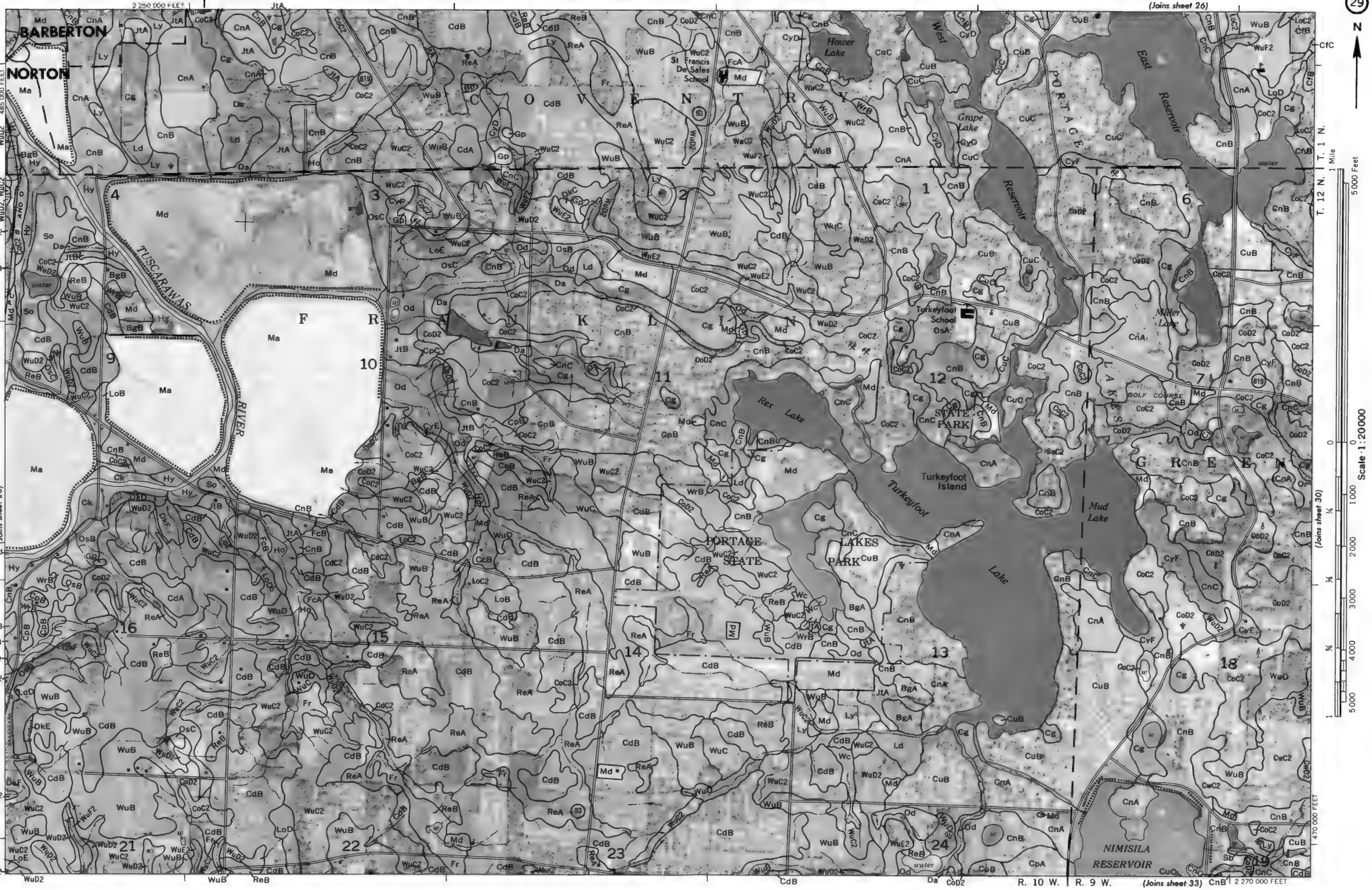
SUMMIT COUNTY, OHIO — SHEET NUMBER 28

Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

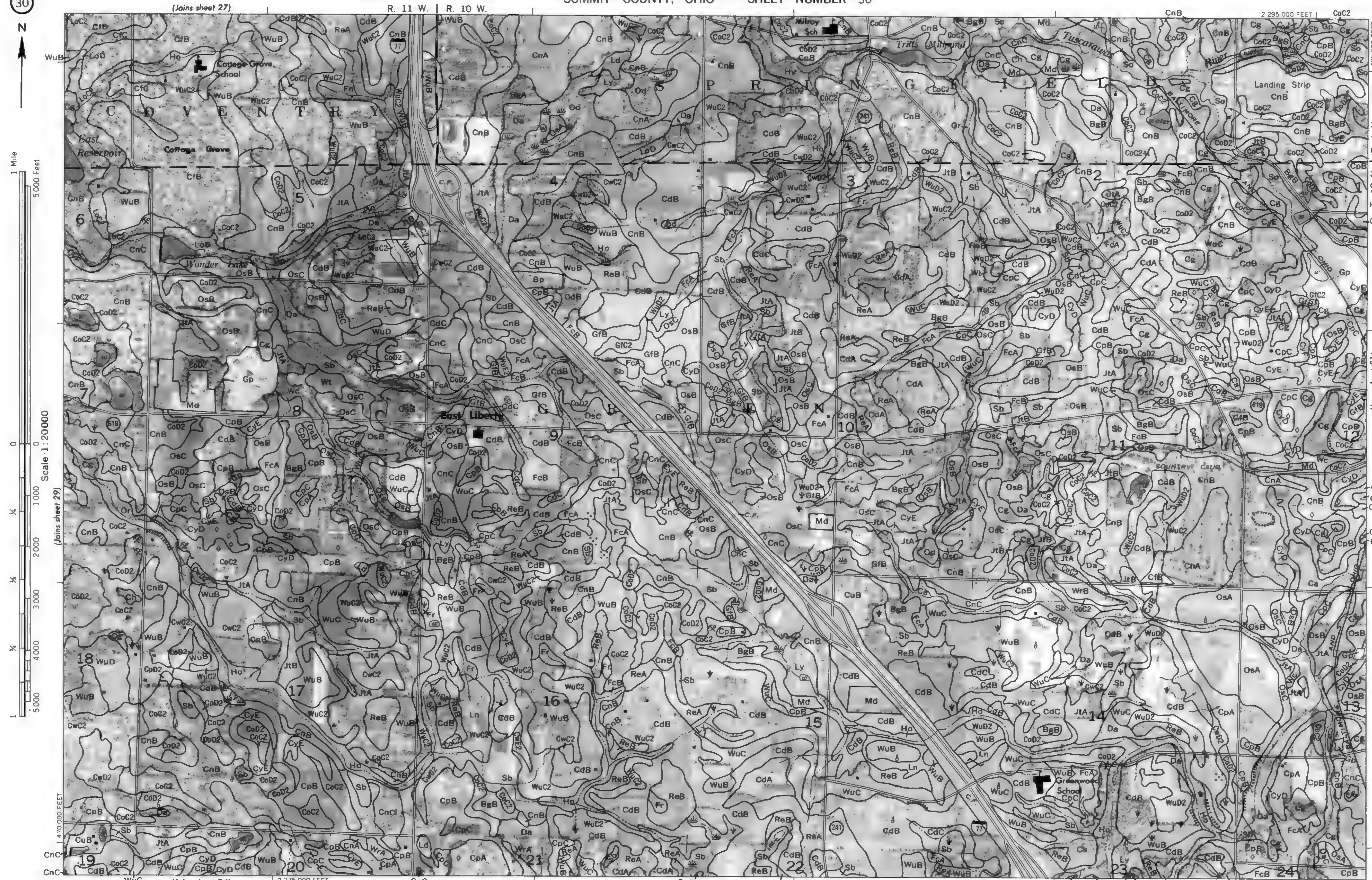
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, and the Ohio Agricultural Research and Development Center.

SUMMIT COUNTY, OHIO — SHEET NUMBER 29



SUMMIT COUNTY, OHIO NO. 29

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Ohio Department of Natural Resources, and the Ohio Agricultural Research and Development Center. Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone. Land division corners are approximately positioned on this map.



Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

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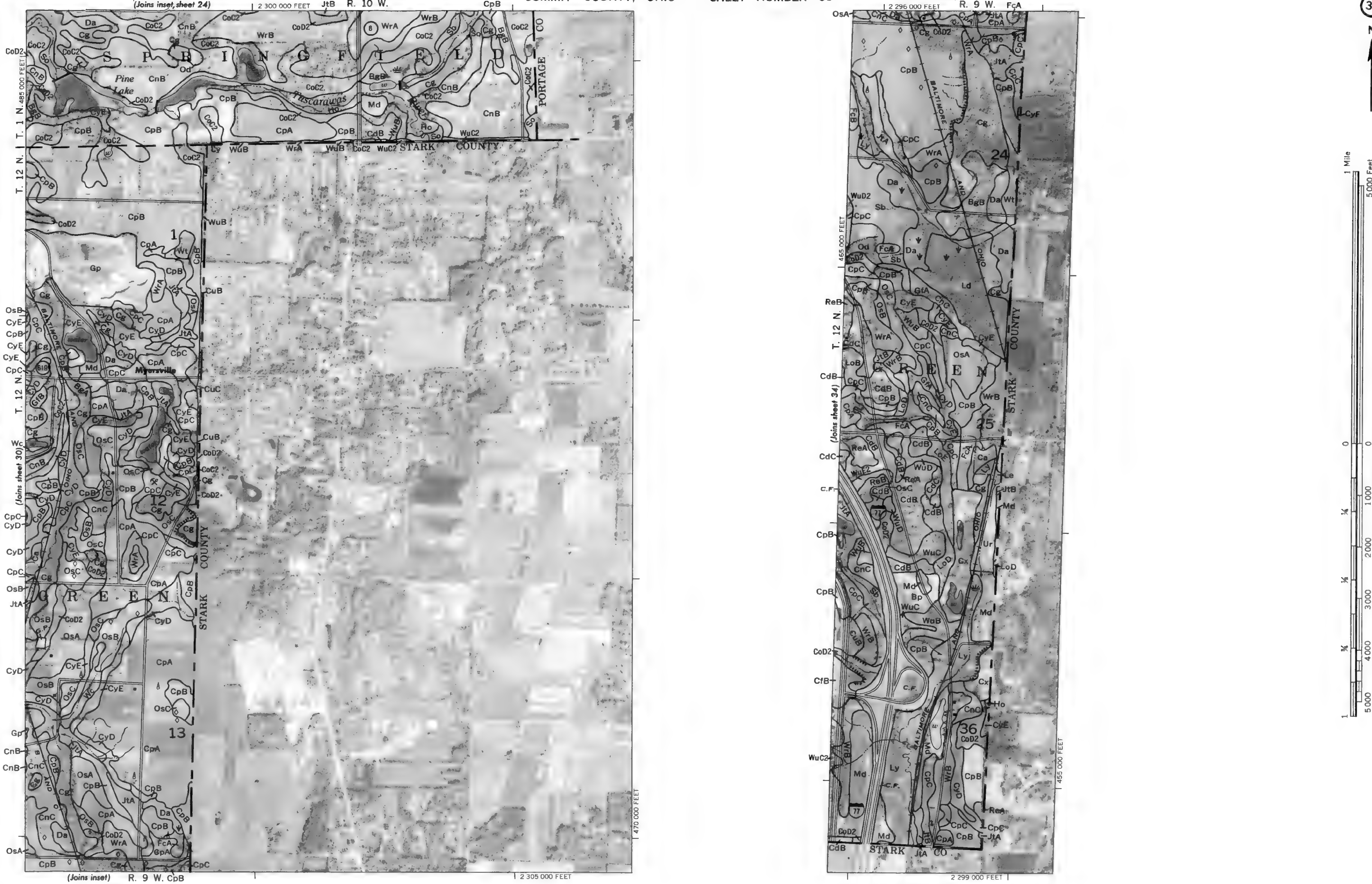
Land division corners are approximately positioned on this map.



3000 AND 5000-FOOT GRID TICKS

SUMMIT COUNTY, OHIO — SHEET NUMBER 32

N

1 Mile
5 000 Feet

Scale 1:20000

Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

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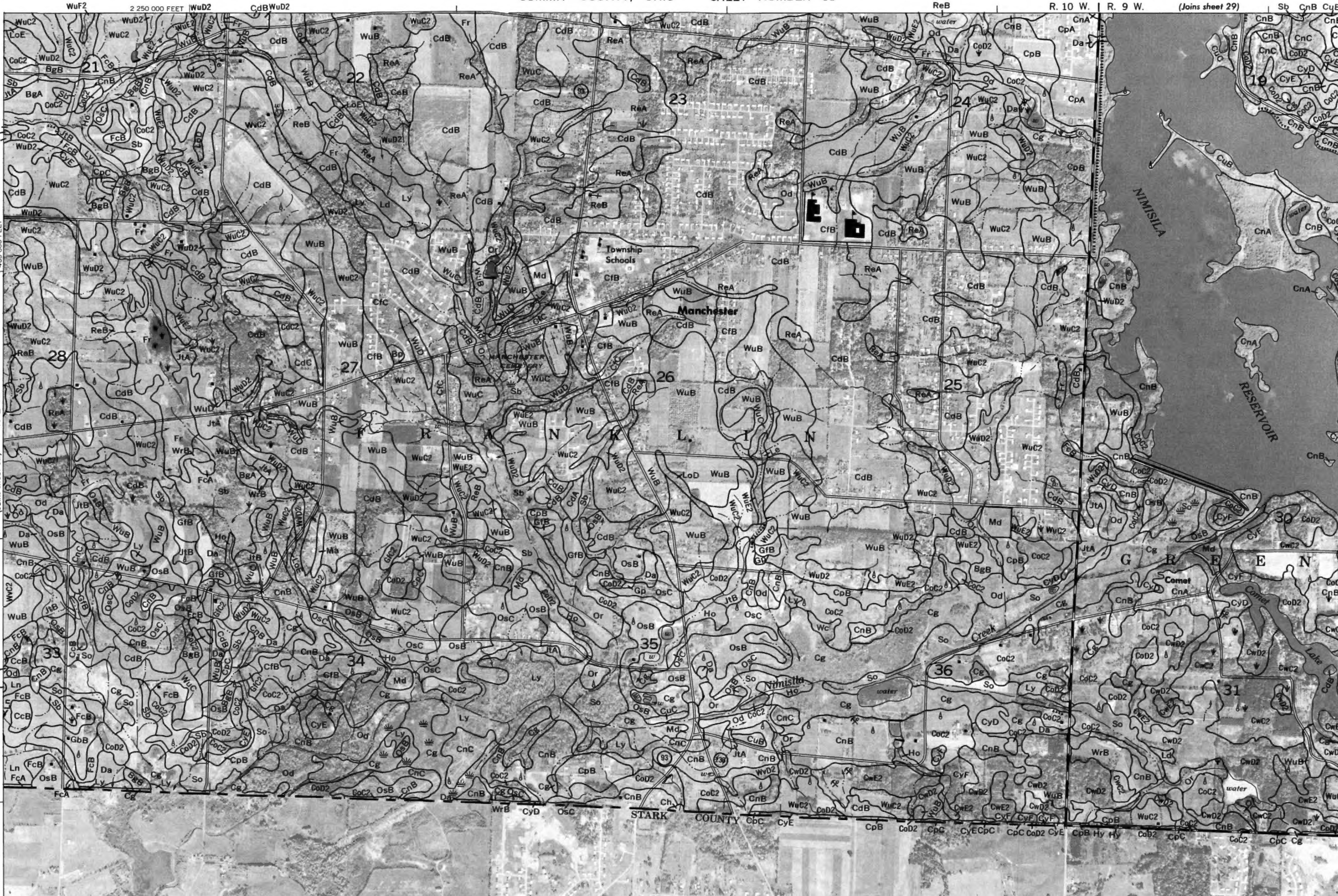
SUMMIT COUNTY, OHIO — SHEET NUMBER 33

(33)



SUMMIT COUNTY, OHIO NO. 33

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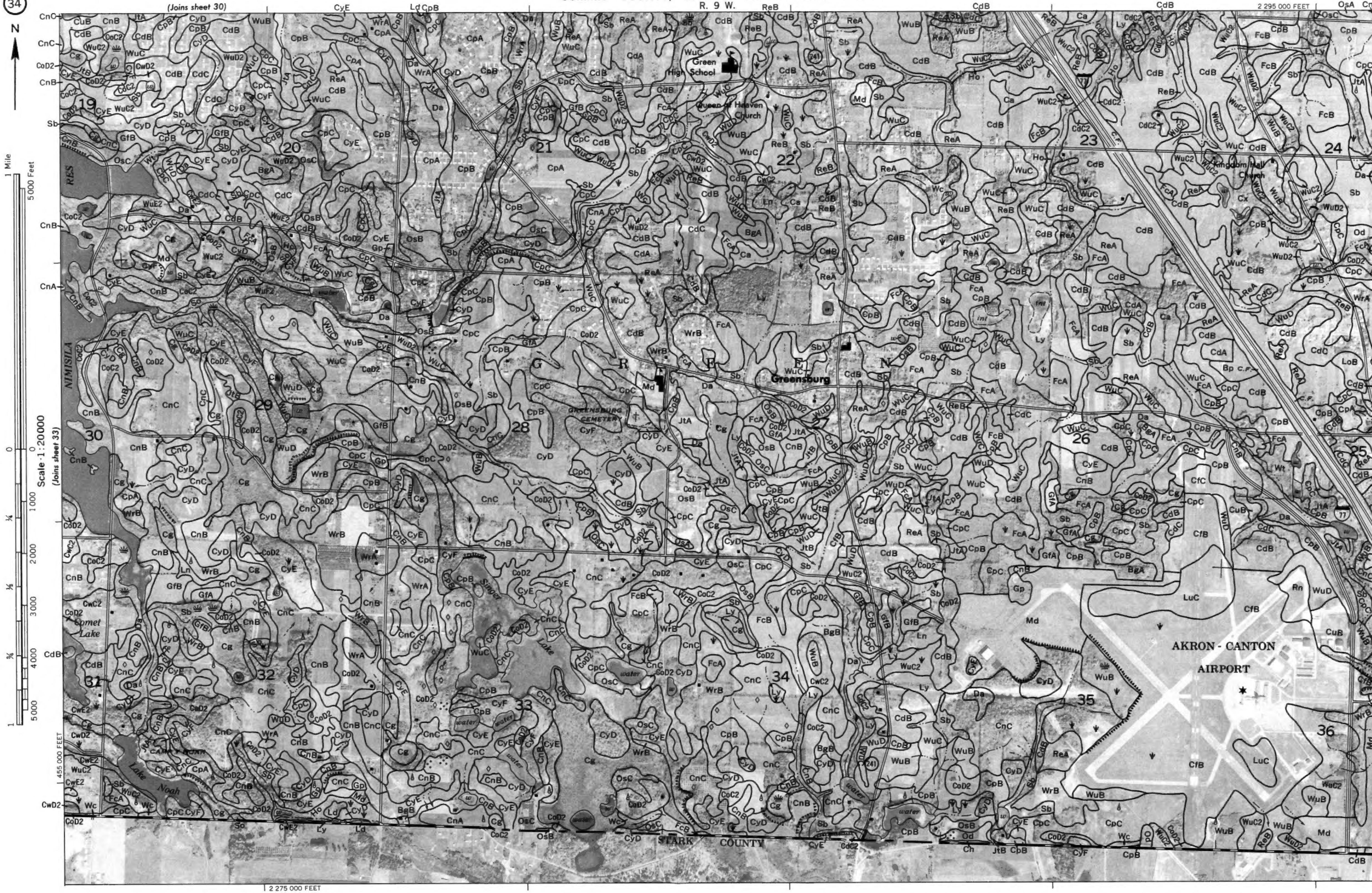
SUMMIT COUNTY, OHIO — SHEET NUMBER 34



Land division corners are approximately positioned on this map.

Photobase from 1970 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

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SUMMIT COUNTY, OHIO NO. 34

SUMMIT COUNTY, OHIO

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Divided
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail
- Railroad
- Ferry — FY
- Ford — FORD
- Grade
- R. R. over
- R. R. under

Buildings
- School
- Church

Mine and quarry

Gravel pit

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

Forest fire or lookout station

Airway beacon

Located object

BOUNDARIES

- National or state
- County
- Minor civil division
- Reservation
- Land grant
- Small park, cemetery, airport
- Land survey division corners

DRAINAGE

Streams, double-line
- Perennial

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements

Aqueduct — AQUEDUCT

Canals and ditches

Canals or ditches abandoned — ABANDONED CANAL

Lakes and ponds
- Perennial — water, w
- Intermittent — int

Spring

Marsh or swamp

Wet spot

Drainage end or alluvial fan

RELIEF

Escarpments
- Bedrock
- Other

Short steep slope

Prominent peak

Depressions (Large, Small)
- Crossable with tillage implements
- Not crossable with tillage implements
- Contains water most of the time

SOIL SURVEY DATA

- Soil boundary and symbol — Dx
- Gravel
- Stoniness
  - Stony
  - Very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully
- Indian mound
- Cut and fill land — C.F.